Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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FISH AND WILDLIFE SERVICE

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.36 ALTERATIONS IN THE BLOOD LEVEL OF LACTIC ACID IN CERTAIN SALMONOID FISHES FOLLOWING MUSCULAR ACTIVITY. II. LAKE TROUT, SALVELINUS NAMAYCHUS

Black, Edgar C. (The University of British Columbia, Vancouver, B. C., Canada)
Journal of the Fisheries Research Board of Canada 14, 645-649 (July 1957)

Black subjected Kamloops trout, Salmo gairdneri, to 15 minutes severe exercise for the purpose of determining the quantitative increase in lactic acid level in the blood (J. Fish. Res. Bd. Canada, 14, (2), 117-134). Continuing the same line of investigation on lake trout, Salvelinus namaycush, during the summer of 1954 at the trout hatchery at Summerland, B. C., 1½-year old hatchery-raised fish were subjected to 15 minutes severe muscular exercise.

In general, previous research on fish had shown that changes in the blood level of lactic acid as a result of muscular activity were much the same as in mammals. The blood lactic acid in fish, however, continued to increase for a longer time following activity, and return to normal required a much longer period. Indeed, in some cases the lactic acid did not diminish and the fish died in a short time.

Method.--Fish were reared in artesian water containing calcium bicarbonate, the temperature was constant the year around at 11.5° to 12.0°C. Blood samples were taken by cardiac puncture while the fish respired in the water. Hemoglobin was determined as acid hematin in a Klett photocolorimeter. Lactic acid was determined by the Barker-Summerson method in the photocolorimeter. Glucose was analyzed by the method of Somogyi. Tungstic acid filtrates were used for the lactic acid determinations, whereas barium and zinc hydroxide filtrates were used for the glucose determinations.

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 ABSTRACTER: J. C. Blucher

1.017 AUSTRALIA DEVELOPS TUNA POTENTIAL

Sardone, L. T.
World Fishing 6, 77-80 (October 1957)

Australia's offshore pelagic fisheries are a relatively new development and carry great promise of expansion. Vessels similar to those used in demersal fishing are operating at present, but a few specialized boats are being developed.

Salmon, barracouta, mackerel, and tuna are the main species caught. These are suitable for smoking or canning, rather than for direct table use, and therefore the development of this fishery is bound up with, and limited by, the economics of cannery operations. The Australian Commonwealth Government has set aside funds to be used to help commercial development of tuna fishing.

Tuna can be found all around Australia's 12,000 miles of coast. The species of greatest commercial value normally do not frequent inshore waters. They form a truly oceanic group of fish, which are thought to make wide migrations. Only part of the migrating populations enter the coastal fishery. The eleven species represented in Australian waters, in order of their present commercial importance, are: (1) southern bluefin tuna, (2) striped tuna, (3) northern bluefin tuna, (4) yellowfin tuna, (5) albacore, (6) Australian bonito, (7) mackerel tuna, (8) frigate mackerel, (9) leaping bonito, (10) oriental bonito, and (11) dogtooth tuna.

Fishing areas.--There are six Australian tuna areas: Area 1 (Eastern Queensland coast and New South Wales, north of Sydney), Area 2 (Sydney--Eastern Victoria--Bass Strait--Tasmania), Area 3 (Western Victoria--South Australia to head of Great Australian Bight), Area 4 (Western Australia from head of Great Australian Bight to Shark Bay), Area 5 (Western Australia from Shark Bay to Lacepede Islands), and Area 6 (Northern Australia from Lacepede Islands to Torres Strait).

Methods.--Southern bluefin tuna are taken by pole and line with live bait and by trolling. They also have been taken in limited amounts with lampara nets.

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 ABSTRACTER: Kathryn L. Osterhaug

0.8 WATER PURIFICATION

Lundborg, M.
Kemisk Tidskrift 67, p. 523 (Nov. 1955) (Stockholm, Sweden)
World Fisheries Abstracts 8, 21-22 (July-August 1957)

In order to supply bacteriologically pure sea water to Swedish W. coast fish canneries for cleaning and cooling purposes, an electrolytic apparatus was devised which was found to be satisfactory. Sea water can be made bacteriologically pure by adding chlorine in 3 ways: as hypochlorite; as chlorine gas; by electrolysis of sea water. Hypochlorite does not keep well, chlorine gas is toxic and difficult to handle, while the electrolytic method seems to offer the best solution to the problem; it is also better from the sea water and bacteriological point of view. Lundborg's apparatus for electrolysis of sea water has been installed in 10 canneries on the Swedish W. coast. The largest of them delivers 1,400 l. (369 gal.) of sea water/min. with 8 to 10 p.p.m. of chlorine, using 6 V and 1,200 amp. A smaller apparatus can be installed in fishing boats for chlorinating sea water used for washing the catch. Electrolytic chlorination of sea water is the most suitable method that can be used in fishing boats. The applications of electrolytic chlorination of water are: rinsing the raw fish such as herrings, sprats, mussels; cleaning the cannery floors, walls, and machinery; washing and purification of shellfish; swimming pools.

The effectiveness of electrolytic chlorination of sea water is illustrated in a table which shows the results of bacteriological investigations of 65 samples of sea water from 7 canneries. The bacterial content was reduced by 99% or more by electrolytic chlorination.

The apparatus is simple, easy to use, and the operating costs are low.

 ABSTRACTER: G. N. Subba Rao

1.953 LEVIATHAN IN THE LAB

Anonymous
The Laboratory 26, 34-38 (1957)

Introduction.--The typical young typist of today may not be aware of it, but whaling plays an important part in her life. Her lipstick has a base of spermaceti, a strange wax from a sperm whale's head. Spermaceti also gives the opalescent sheen to her face cream and her boss's brushless shave. Spermaceti is used in shaping the graphite rod in her pencil, in stamping out the metal caps on the bottle of coke she drinks, and in the ointment she rubs on her sunburn. Purified sperm oil lubricates the typist's new electric typewriter and makes the ink spread smoothly on the ribbon. Spermaceti is in the plasticizer on her carbon paper, in the ink on her magazine, and in her new leather jacket to keep it soft and pliable. Sulfonated sperm oil goes into the detergent she uses on her nylons and into the tanning compound that made her white calfskin gloves. Sulfurized sperm oil controls the viscosity and extreme pressure properties of the hydraulic fluid in her boy friend's car. Completely hydrolized, oxidized, and polymerized spermaceti guards the sheen of her fur coat.

If the typist lived in Oslo instead of Ohio, she would take vitamin A extracted from the liver of a giant rorqual whale, and the margarine on her breakfast pastry would be hydrogenated whale oil. Someone in her family might owe his life to insulin, adrenalin, thyroxin, pituitrin, or ACTH from a whale's huge glands.

Types of whales.--Whales come in two clans, the rorquals or baleen whales and the toothed whales, of which the sperm is most important. The blue whale, which is an example of a rorqual, may grow to 100 feet in length and weigh over 150 tons. The rorquals have an internal moustache

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 ABSTRACTER: Martin Heerdt

LACTIC ACID IN TROUT

SEA-WATER TREATMENT

AUSTRALIAN TUNA

PRODUCTS FROM WHALES

0.8

1.953

that strains tiny shrimp-like crustaceans from the sea water. This microscopic fodder is converted by whales into pure fats or triglycerides, which are a combination of glycerine and free-fatty acids. The sperm whale, in contrast, has a mouth full of strong teeth with which he dines on giant squid from the ocean floor. His peculiar diet is transformed into a liquid wax or sperm oil. This oil is composed of long straight-chain alcohols having a single double bond and joined end to end with equally long straight-chain mono-unsaturated acids.

Products from whales. -- European chemists use rorqual whales as a source of vitamins, hormones, and edible fats. From the rorqual whale, chemists also freeze and can whale meat for food, make high protein animal feed, and convert the oil into soap and glycerine. In America, these products are more cheaply and easily obtained from the sperm whale. Sperm oil resists changes in viscosity as the temperature rises or falls, has high film strength, and lubricates well under high pressure and at high speeds. Sperm oil wets most metals, creeps into the smallest crevices, pushes a lubricating film under rust spots, and shuts out moisture without getting gummy or turning rancid. Sperm-oil wax molecules can be split chemically to make acids and alcohols. These alcohols and acids are hydrogenated, halogenated, sulfated, sulfonated, sulfurized, polymerized, and otherwise modified to make an endless number of products.

Oil chemists believe that the water shortage in desert regions can be reduced by spraying a one ten-millionth inch thick film of sperm oil alcohols--an active ingredient of sun-tan oils--over the surface of the land. These alcohol molecules stand on end at the surface like bristles on a brush and are so closely packed that water molecules cannot escape, whereas oxygen passes through them freely. Experimentally, this type of film has reduced water evaporation by 60 percent in Texas, where evaporation annually drains $3\frac{1}{4}$ million gallons of water skyward from every acre.

0.36

Results and discussions. -- The blood level of lactic acid increased sevenfold during exercise, and continued to increase for two hours thereafter. The post-exercise level persisted for 6 hours, then the level declined to normal. Hemoglobin levels did not change significantly in 24 hours. The blood glucose level almost doubled by the second hour of recovery and persisted at a high level to the end of 24 hours. Analytical results in round figures were:

		Hours after exercise								
Unexercised	Exercised	1	2	3	4	6	8	12	16	24
		Glucose (mg. per 100 ml. whole blood)								
75	88	-	136	128	152	116	143	97	134	120
		Lactic Acid (mg. per 100 ml. whole blood)								
14	92	154	177	151	90	100	56	28	21	15

The changes in blood lactic acid and glucose are essentially the same as the changes reported for the Kamloops trout.

Assuming that the increase in lactic acid in the blood is at the expense of muscle glycogen, it will be interesting to determine what relationship the increased blood level of glucose in the lake trout following activity may have to the possible restoration of muscle glycogen.

1.017 (Cross Reference: 1.12)

Striped tuna are taken by troll line and by live bait and poles. Pilchards, which could be used for live bait, are common in South Australian coastal waters in summer and autumn. Anchovies also are suitable for live bait, and have been observed in good quantities in many places along the coast.

Northern bluefin tuna very rarely are taken by trolling but are taken by beach seines when the tuna are found close to beaches.

Albacore are taken by trolling only, and although a few specimens of yellowfin are taken by the fishing fleet, it is common knowledge in the Danish seine fishing fleet in southern New South Wales that in autumn months large yellowfin frequently follow the seine to the surface, catching small fish that escape from the cod end of the net.

Boats. -- The number of craft in Australian waters equipped for live-bait tuna fishing is approximately fifteen. The largest vessel is a fine, sea-going tuna clipper, fishing in New South Wales waters. She is a 128-foot ship, with a beam of 22 feet 6 inches, a molded depth of 10 feet 9 inches, and $2\frac{1}{2}$-inch planking. Formerly a luxury tourist craft, she now has five refrigerated wells on each side of the vessel, with a total capacity of 30 tons. Accommodations are provided for a crew of fourteen.

Typical also is another New South Wales craft, 80 feet by 20 feet by 18 feet (molded). The 20-foot by 18-foot hold, however, has a height of only 4 feet 6 inches. There are accommodations for twelve; four in two deck cabins and eight below.

Markets. --Barely 8 years old, Australia's tuna fishery is one of her younger industries, but is is a lusty youngster. Australians have not, as yet, taken to tuna, the average consumption being 1/10 tin (7 ounce) per head per annum. That compares with 3 tins in the U. S. A. and with 1 in the United Kingdom.

The tuna of Australia is comparable with the best in the world. In the opinion of visiting technicians, it is definitely top quality.

The industry is now striving to build up local consumption to 1 tin per head per annum, at the same time attempting to strengthen the United Kingdom market, in fierce competition with both Japan and Peru. Japan has secured a foothold here through the Board of Trade, with a quota of some £ 500,000 sterling.

2.01 THE ACTION OF PSEUDOMONAS ON FISH MUSCLE: 1. ORGANISMS RESPONSIBLE FOR ODORS PRODUCED DURING INCIPIENT SPOILAGE OF CHILLED FISH MUSCLE

Castell, C. H. and Greenough, Maxine F. (Fisheries Technological Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 14, 617-625 (July 1957)

When fish muscle spoils it tends to develop a fairly regular succession of odors and to produce an easily recognized spoilage pattern. Shewan and his coworkers (1953) listed many of the characteristic odors and the relative order in which they appeared. No single fish successively develops all of these odors; however, at one time or another most of the odors have been encountered in the muscle of cod, haddock, flounder, and halibut taken along the Canadian Atlantic Coast.

Odor development by stages.--For convenience, the spoilage of chilled fish muscle may be divided into four stages. In stage one, muscle cut from fresh fish has a characteristic fresh fish odor or sea-fresh tang that varies slightly with different species. In stage two, the odor of the muscle is characterized chiefly by the loss of some of the fresh fish odor but without the development of any spoilage odors. In stage three, the first spoilage odors appear in the muscle. These odors vary considerably depending upon the season of the year. In some instances, they are sweet or perfume-like and suggestive of the delicate odor of the certain chemical esters found in fresh fruits. This fresh fruit odor usually develops into an odor characteristic of sour or fermenting fruit or into an odor suggestive of fresh and spoiling vegetables such as cabbage or musty potatoes. In stage four, the last stage, stronger and more offensive odors develop, and the fish is usually described as rotten, putrid, or faecal, depending upon the amount of dimethylamine, hydrogen sulphide, ammonia, indole, and other spoilage compounds.

This paper is concerned with the bacteria that produce the odors so frequently encountered during the incipient stage of spoilage while the fish is still merchantable.

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 ABSTRACTER: Martin Heerdt

2.05 TYPE E BOTULISM

Dolman, C. E.
Canadian Journal of Public Health 48, 187 (May 1957)
Journal of the American Dietetic Association 33, 1060 (October 1957)

About 100 type E strains of Clostridium botulinum have been isolated from the flesh of fish and marine mammals implicated in outbreaks of human botulism in various countries of the northern hemisphere, from soil, lake shore or sea mud in British Columbia, Japan, Denmark, and Greenland, and from normal fish intestines in Japan and France. The fickle and comparatively feeble toxigenic characteristics of even freshly isolated type E strains are in marked contrast with the unusually rapid course and the heavy fatality rate in many outbreaks of type E botulism. Roughly one-half of the 100 strains have been subjected to intensive study of their distinctive cultural, biochemical, and toxigenic properties. Toxigenic type E strains tend to become atoxic because they readily degenerate into an opaque and sporulating colonial mutant, or less often into a proteolytic mutant. These mutants, whether cultured alone or together, are incapable of toxin production; but either of them may revert to the toxigenic phase. If toxigenic and proteolytic mutants are grown in the same medium, or their filtrates are pooled, the toxic potency is markedly increased in terms of mouse lethality. Type E toxins can be "activated" by incubation for a few hours at 37° C. with 1 percent trypsin at about pH 6.0, so that their mouse lethalities may increase up to 10,000 fold or more. Preliminary tests suggest that the antitoxin-binding power of such activated toxins is not markedly affected. The paradoxically high average fatality rate in human type E botulism has been interpreted in the light of these toxin-activating phenomena. To date, 32 outbreaks of type E botulism have been recorded, involving a total of 145 persons, with 56 deaths, a case fatality rate of 38.6 percent. Of the 27 outbreaks which have occurred in regions bordering the North Pacific Ocean, 20 were in Japan, 4 in British Columbia, 2 in Alaska, and 1 in California. A brief account is given of previously

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 Reprinted in whole

2.01 THE ACTION OF PSEUDOMONAS ON FISH MUSCLE: 2. MUSTY AND POTATO-LIKE ODORS

Castell, C. H.; Greenough, Maxine F.; and Jenkin, Norma L. (Fisheries Technological Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 14, 775-782 (September 1957)

This paper is concerned with one specific group of spoilage odors and the bacteria that produce them. The paper identifies and describes these bacteria. The odors are musty in nature, and when concentrated or obtained from pure cultures, they are strikingly similar to the odor of stored potatoes. The potato odor has been observed under commercial conditions on chilled fillets of cod, haddock, and flounder, as well as on halibut sticks. Usually it is accompanied by sour, fruity, or onion-like odors to which it adds a characteristic mustiness. Although the musty odor organisms have been isolated from the surface slime of iced cod and haddock, this odor has not been detected in fresh or spoiled round or gutted fish. The odor is most frequently detected in colonies growing on nutrient agar plates when making bacterial counts from iced fillets.

Cultural characteristics.--The organisms that produce the musty odors are neither proteolytic nor lipolytic; neither do they ferment sugars, reduce trimethylamine oxide, reduce nitrate, reduce nitrite, nor do they cause observable changes in milk. They do, however, produce ammonia from peptone, various amino acids from urea, and hydrogen sulphide from cystine and methionine. In addition, they are psychrophilic in that they grow at all temperatures between 0° and 25° C. but not at 37° or above. The organisms that the authors isolated from fish were transferred to nutrient agar at approximately 2-month intervals for 6 years and were stored at 0° to 2° C. Under these conditions, they still retained their ability to produce the odor without any apparent diminution of odor intensity. The composition of the substrate and the pH of the substrate each has a marked influence on the production and intensity of the musty odor.

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 ABSTRACTER: Martin Heerdt

2.111 ARE SYNTHETIC NETS THE ANSWER?--I.

Anonymous
World Fishing 6, 53-58 (October 1957)

All over the world, nylon and other types of synthetic nets rapidly are increasing in importance. Reports of spectacular jumps in fishery production almost always are ascribed to the use of synthetic nets in place of a traditional material. There is, however, still in many quarters a certain caution, a feeling that synthetics are still very much on "trial" in the fishing industry.

Gill netting at present is the most important use for nylon and other synthetics, such as Terylene, in the fishing industry. Nylon also has proved an excellent material for ropes, net fittings, long lines, and lobster pots. The success of nylon for use in gill nets primarily is based on the ability of a nylon gill net to catch more fish than can a natural fiber net operating under comparable conditions.

Visibility.--A nylon gill net catches more fish because it is less visible in water. This decrease in visibility is due to a variety of causes: (1) Nylon is translucent in water. (2) Nylon yarn is so strong that it often is possible to use a finer twine; this is less visible in itself and results in a net creating less disturbance in moving water. (3) The nylon twine appears even finer than it really is; as it is made from continuous filament nylon yarn, it is completely smooth, and there is none of the tiny protruding fibers that, on a natural fiber net, pick up tiny particles and make the twine appear larger than it really is. (4) A nylon net is easy to dye, and the color can be controlled within very fine limits. The net thus can be made to blend almost completely into its own waters. Blues and greens are used extensively, and various other colors are used in certain localities. Pink, for example, has proved successful in the Japanese coral seas.

Strength and elasticity.--Nylon yarn normally employed for netting has a tenacity ranging from 7 grams per denier (equivalent to about 100,000 lb./sq. in.) to 8.8 grams per denier. In addition to

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 ABSTRACTER: Kathryn L. Osterhaug

INCIPIENT SPOILAGE ORGANISMS

MUSTY SPOILAGE OF FISH

TYPE E BOTULISM

SYNTHETIC NETTING

2.01 (Cross Reference: 0.5)

Summary and discussion. -- The cultures of bacteria that were isolated from fresh and spoiled fish muscle and which developed a characteristic musty or stored potato odor have been identified as Pseudomonas perolens. The same species appears to have been isolated and identified by Spanswick (1930) and by Jensen (1948) from musty meats. Similar or closely related organisms have been isolated from foods by other workers. These foods also possessed musty or potato-like odors.

The characteristic potato odor was produced when Pseudomonas perolens was grown on a wide range of culture media. Protein hydrolysates and many of the amino acids are good substances both for growth and musty odor production. The musty odor was produced by the organisms when sodium nitrate was the only source of carbon. The outstanding characteristic of the organism was its ability to grow at low temperatures and its general inertness on proteins, fats, sugars, and many carbohydrates. Sodium nitrite did not inhibit the production of the musty odor by Pseudomonas perolens.

2.111

having high tensile strength, nylon has the advantage of remarkably high shock strength. This high shock strength is due to the fiber's extensibility and excellent powers of elastic recovery. The net is thus particularly well fitted to catch and hold a really fighting fish. In addition, the mesh size remains constant throughout the life of the net.

Prices. -- Although nylon yarn is more expensive than the natural fibers, the difference in price between a net made from nylon and a similar net made from cotton or flax is much less than might be supposed. In some instances a nylon net is, in fact, cheaper. There are several points to be considered: (1) The great strength of nylon frequently makes it possible to use a finer twine. (2) Nylon has a very low specific gravity. Thus, a pound of nylon twine of a given thickness contains a substantially greater number of yards than a pound of any other twine of the same thickness. (3) As a nylon net is light in weight and less bulky than a natural fiber net, it frequently requires lighter fittings. (4) As nylon is completely rot-proof, it does not require any special dressings.

Ease of handling. -- As nylon enables a finer twine to be used, a substantial reduction in the total weight of the net is realized, particularly since nylon also has a low specific gravity. There is also a saving in bulk. The fisherman can turn this to advantage either by increasing his margin of safety or by carrying additional length of net and thus increasing his potential catching power. In addition, he has the very important benefit of easier handling. Ease of handling is made even greater by the much smaller increase in weight of a nylon net when it becomes wet than that of a natural fiber net.

The lower moisture uptake of nylon also facilitates routine maintenance because the net dries out more rapidly. In many instances, the drying out of nets has been abandoned completely, however, since nylon is rot-proof and cannot come to any harm if it is stored in a wet condition.

One further factor that contributes to the easier handling of nylon nets is the complete flexibility that nylon twine and netting retain under all conditions. Even when it is soaking wet or used in subzero temperatures, nylon does not stiffen or become hard, as the natural fibers do.

Generally speaking, the life of a nylon gill net is seldom appreciably longer than that of the natural fiber net that it replaces. The chief attraction is normally greater catching power rather than longer life.

This is the first of two articles on synthetic fiber netting.

2.01 (Cross Reference: 0.5)

The source of cultures. --Most of the cultures were isolated from routine nutrient agar plates prepared with fresh and spoiled fish. Only 135 of the original cultures (about 15 or 20 species) that produced characteristic odors were selected for detailed study, to eliminate obviously similar species. In general, the organisms in this group may be described as: gram-negative rods; non-motile or motile with polar flagella; and producers of green or blue-green water soluble pigments. They are generally inactive in fermenting sugars and other carbohydrates; however, they do produce acid but not gas from dextrose. All produce catalase, are aerobic, and tend to be psychrophilic. Most of the cultures show little or no growth at 37° C., better growth at 10° to 15° C. than at 25° C., and slow growth at 0° to 2° C.

Identification of cultures to genera. --Originally the cultures appeared to consist of Pseudomonas and Achromobacter. Later when flagella stains were used the motile achromogenic cultures showed polar flagella that are indicative of the genera Pseudomonas. The remaining non-motile achromogenic cultures fell into a uniform group with the other cultures; therefore they too were classified as Pseudomonas. Other genera commonly associated with fish and fish spoilage were not encountered.

Results. --All of the characteristic odors were produced at all temperatures in the range 0° to 25° C. These odors appeared much earlier at temperatures of 10° to 25° C. At 0° to 2° C., the rate of odor production showed considerable variation. Many cultures held at 25° C. produced a succession of odors and reached the last stage in only two to three days. The same cultures held at 0° to 2° C. often did not reach the initial odor stage until after a week of storage. Most of the cultures lost their ability to produce their characteristic odors after repeated transfers on agar media over a period of several years. Others retained their characteristic odor after repeated transfers over a period of 6 years. Fruity odors were encountered more often in fillets than in round, gutted, or dressed fish, and were most prevalent in the fall, winter, and early spring, on flat fish as well as other bottom fish. Sodium nitrite as a dip prolonged and intensified the third spoilage stage in fresh fillets.

2.05

unreported occurrences in Alaska and Labrador, both involving Eskimos in which the incriminated foods were beluga and seal flipper, respectively.

2.1121 ARE SYNTHETIC NETS THE ANSWER?--II.

Anonymous
World Fishing 6, 34-38, 43 (November 1957)

Purse seines.--Purse seines well may be the next important market in which synthetic fiber nets become established. Norwegian herring seiners already are moving in this direction.

Whereas economical operation is the benefit obtained by using synthetics both in purse seines and gill nets, the method by which the economy is achieved is somewhat different in each case. A nylon purse seine catches more fish. This is attributable almost entirely to the great strength of the yarn--tensile strength, wet strength, knot strength, and shock strength. A nylon purse seine is capable of holding a greater weight of fish.

Because of the greater strength of synthetic fibers, nets made from them make greater aggregate catches by being able to continue fishing in more severe weather conditions. The nets are able to take greater strain, and they are lighter in weight, less bulky, and easier to handle.

Bottom trawls.--Relatively little use has been made, up to the present, of virgin nylon yarn for bottom trawls, but trials with nets made from nylon braid have demonstrated the value of nylon for this purpose. Several distant water trawlers operating from Grimsby are equipped with synthetic nets. Double knots effectively prevent slippage; and batings, belly, lengthening pieces, and cod ends are made of nylon, whereas in most nets the square and wings still are made of manila. The belly of the net usually is constructed from nylon braid with a breaking strain of 400 pounds, and is more than four times as strong as the conventional four-strand 60 manila. Lengthening pieces are made from nylon braid with a breaking strain of 840 pounds instead of from the conventional double thickness of four-strand 75 manila. The nylon nets are exceptionally strong in comparison with the standard-type net.

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 ABSTRACTER: Kathryn L. Osterhaug

2.1121 DESIGN AND OPERATION OF THE THAMES FLOATING SPRAT TRAWL

Noel, H. S.
World Fishing 6, 62-65 (October 1957)

The floating sprat trawl is essentially a tapering funnel of square section with wings tapering to the four towing points formed by the roping. Mesh in the entry is of 2-inch rope reducing to 1 inch in the cod-end of the main net, to which are attached three 20-foot sleeves of proofed cotton net of 7/8-inch mesh, 180 meshes wide, giving an overall length of 186 feet. For the main net, nylon twine and nylon roping have proved to be far superior to natural fiber for strength, ability to withstand rot, and water resistance. To the present, cotton has proved satisfactory for the sleeves, as these soon are weakened by loading operations and are renewed before rot has time to take place. The headline is supported by 6 or 8 spherical floats of 6-inch diameter, whereas the lower wings are sunk by a 67-pound weight on either wing end, shackled to a foot of light chain.

Fishing operation.--To prepare the gear for fishing, the net is flaked down aft on the "leader," and the wings, marked to identify upper and lower, are laid out, ready to pass to the other vessel. The cod-end is tied about 6 feet back, to provide slack net for loading, using a cod-end buoy rope of ample length. On locating a satisfactory shoal, the "leader" steams down tide to overrun it and then turns into the tide, streaming the net as quickly as possible. When the net is streamed as far as the entry, speed is dropped to steerage way, and the net is checked while the other vessel comes alongside to receive its wings from the third hand, with instructions as to warp, speed and so on. To avoid delay, the second boat must always stay clear behind the "leader," and it is advisable to shackle heavy clip hanks to the warps so that the wings can be attached without delay. As the boats part, the lower warps are released, followed by the upper warps until the required marks are reached on the wire. Because of its greater angle, extra length is required on the lower warp, depending upon the depth fished.

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 ABSTRACTER: Kathryn L. Osterhaug

2.1121 THE WIRE WORKING GEAR OF THE GRANTON TRAWL

Garner, John
World Fishing 6, 87-88, 90 (October 1957)

After a check has been made that the trawl was laid correctly, each fishing line is stretched parallel to the appropriate bobbin wire or length of wing bobbins, and the beckets and handcuff lines are seized onto corresponding positions on the fishing lines with needles of double twine.

The Danlenos.--Attached to each wing end of the trawl is a Danleno, which is designed to keep the mouth of the trawl open by means of a spread bar (butterfly) and to protect the wing ends. A complete Danleno has four principal parts: (1) The Danleno bobbin is similar to the bosom iron bobbin and prevents the butterfly from tilting when being towed, thus preventing the wings from closing together. (2) The spindle is an iron bar that passes snugly through the central hole in the Danleno bobbin. It has an aperture at each end large enough to allow the pin of a heavy shackle to pass through. (3) The butterfly is an angle bar of flat iron, with one side of the angle being shorter than the other by about 1 foot. The shorter side is nearer the sea-bed during towing and is called "the toe." The longer side is called the head, as it is connected to the headline. There are three holes through the butterfly to secure the pins of warp shackles. Its purpose is to spread the wings vertically. (4) The swivel has a link at each end for connecting with the warp shackles.

The toe or tow leg.--The wing bobbin is attached to the toe of the butterfly with a warp shackle. The length of this leg varies, but the most popular length is 10 to 20 feet, including an eye spliced at either end. Sometimes a length of rubber wing bobbins is used in place of the toe leg.

The headline leg.--This is the connecting leg between the thimble eye of the headline and the head of the butterfly. The leg is fixed with a headline shackle at the thimble and a ¾-inch shackle at the head. The headline leg should be of the same length as the toe leg to maintain the correct pull on the trawl.

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 ABSTRACTER: Kathryn L. Osterhaug

2.3 BACTERIA TESTS WITH FISH BOXES

Anonymous
Fisheries Newsletter (Australia) 16, 21 (May 1957)

Dr. Spencer gave figures showing the number of bacteria per square inch of the inside of wooden fish boxes: (1) new unused box--70, (2) new boxes, used once, sampled before cleaning--20 million, (3) old boxes, sampled before cleaning--450 million, (4) new boxes, used once, after cleaning by hosing with water--2 million, (5) old boxes after cleaning by hosing with water--175 million, and (6) old boxes after hosing with water and steaming for one hour--260 thousand.

With old boxes, quite strong disinfectants were necessary to give reasonable cleaning, and with an old well-used box having a surface contamination of hundreds of millions of bacteria per square inch, even a reduction of 99.9 percent in the number of bacteria would still leave hundreds of thousands of bacteria per square inch of the box. The general conclusion was that heavily contaminated wooden surfaces were almost impossible to clean satisfactorily.

Turning to method of cleaning dirty well-used fish boxes, Dr. Spencer gave these details:

Method of cleaning	Percent reduction of bacteria
Hosing with water alone	40
Scrubbing with water alone	64
Hosing with hypochlorite solution containing 100 p.p.m. free chlorine	60
Hosing with hypochlorite solution containing 1,000 p.p.m. free chlorine	97.5

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SYNTHETIC FIBER FISHING NETS

THE GRANTON TRAWL

FLOATING SPRAT TRAWL

FISH BOX SANITATION

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The otter doors.--These two doors usually are considered to be the most important accessory of the trawl because they are necessary for its operation. The most popular door for deep-sea trawling is 5 feet by 10 feet and weighs from 14 to 18 cwt.

A distinct difference exists between a fore door and an after door. The fore one is rigged for working at the left side of the trawl (facing) and the after one, for the right side. When working the trawl from the port side of the vessel, however, the door that is used port side aft is rigged similarly to the starboard fore door.

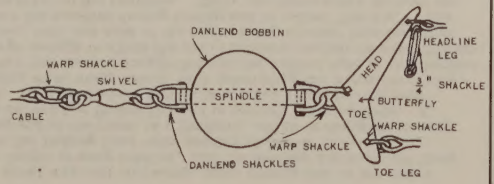

Figure 1.--A complete Danleno.

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Method of cleaning	Percent reduction of bacteria
Hosing with 0.1 percent solution of a quaternary ammonium compound	54
Hosing with 0.5 percent solution of a quaternary ammonium compound	99.83
Scrubbing with a non-ionic detergent	48
Scrubbing with 0.1 percent solution of a quaternary ammonium compound	95

Experiments in comparing the degree of contamination and of cleaning obtainable with resin-coated and uncoated wooden boxes showed that the resin-coated boxes became less heavily soiled and were much more easily cleaned.

Recent study of a mechanized fish filleting line in Canada showed that fillets picked up bacteria of the order of thousands to the square inch from all surfaces with which they might come in contact, such as parts of conveyor belts and cutting boards.

One way in which contamination of fillets could be reduced was by "in plant chlorination." This consisted of chlorinating the water supply of the plant to a final concentration of about 5 parts per million of chlorine. This had no deleterious effect on the fish, but was sufficient to kill bacteria present. This mildly disinfectant water was then used copiously for washing the whole fish, filleting benches, conveyor belts and the fillets, with beneficial results.

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Mid-water trawls.--The use of synthetic fibers in mid-water trawls is still in the experimental stage, but results that have been obtained so far are encouraging. Synthetics eventually may claim a substantial share of this market. The chief attraction is that synthetic fiber nets make larger catches possible because the greater strength of the netting makes it possible to use finer nets and to trawl them faster.

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No hard and fast rule can be laid down for the length of warp needed to fish any given depth, as this depends on the varying factors of speed, type of net, and distances between boats. Until accurate electronic aids are developed, a guide can be obtained by measuring the warp angle and calculating the net depth with the aid of tables. Station-keeping and speed affect net depth considerably, and whereas the former comes with practice, the revolution counter is the answer to the latter. Close station will raise the net, and wide station will lower it, because of the loss of way; the distance between boats should be such as to extend the angle formed by the net selvedges.

It often is necessary to turn in order to pass through a shoal for a second time, the outer boat turning fast round the inner, which must keep weight on the warps to avoid fouling the net or allowing it to drop. Towing against the tide need not produce headway, it being sufficient to stem the tide or even make sternway against it when it is very fast running.

Length of haul is determined by the density of the shoal, and it is possible, under ideal conditions, to catch the net's capacity of 200 bushels in as little as a 15-minutes tow, at which time an indication is given by the cod buoy pulling under and by loss of way. A really full net is a liability, as the time taken to get 5 tons of tightly packed fish alongside safely is often more than that taken for another haul.

There can be no doubt that this form of fishing, being more positive in action and producing fish that are unmarked by the gill-net, has considerable advantage over drift netting. It seems possible that this form of fishing could be used for other types of pelagic fish.

2.114 THE CONTROLLABLE PITCH PROPELLER: FROM DENMARK COMES A WHEEL ESPECIALLY DESIGNED FOR FISHING

Meulengracht, Per V.
Western Fisheries 55, 20, 22 (November 1957)

The controllable pitch propeller now is being used almost exclusively in vessels of the large, Scandinavian fishing fleets, because it offers great advantages, particularly under varying load and speed conditions.

The most obvious advantage of controllable pitch is that the engine can run at its normal rpm at all vessel speeds and, if necessary, can develop its full horsepower even under a dead pull or when towing or dragging at 1½ to 2 knots.

Because most controllable pitch propellers are fully reversible, no gear or direct reversing of the engine is needed. If a sailing clutch is installed, the propeller can be stopped without shutting down the engine. This is of importance during fishing operations when it is not always desirable to have the propeller turning, although the engine has to run for the winch to operate through the power take-off.

The propeller blades also can be adjusted to a "no-pitch" position so that the propeller will not "windmill" when the clutch is disengaged, even when the vessel is still moving. The fine adjustment of the pitch that is possible with a controllable pitch propeller enables the skipper to "inch" along without continuously engaging and disengaging the clutch. The engine meanwhile can be running at any desired rpm.

The modern types of controllable pitch propellers are operated hydraulically and can be built together with the sailing clutch in one compact unit that lends itself to the use of pilot house controls, which are generally standard equipment. With the governor control located in the wheelhouse, the skipper has full control of the pitch, clutch, and governor from the bridge. Consequently, he easily

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 ABSTRACTER: Kathryn L. Osterhaug

2.3 NEW MECHANICAL PEELER IN USE IN THE SHRIMP INDUSTRY

Anonymous
Seafood Merchandising (Southern Fisherman) 17, 32 (November 1957)

After an extended period of rigid production testing under commercial operating conditions, a new mechanical shrimp peeler is now available to the industry. The new peeler, which is fully automatic, has been in use commercially for four years.

With a strip-and-roll rather than a pinch-and-squeeze action, the machine will handle shrimp of any size, at the rate of better than 1,000 pounds per hour, so gently that breakage is held to low levels, outer skin is not roughened, and desirable color is retained. The device can be operated by one man.

Louisiana shrimp processed with the new machine are declared to have shown up to 30 percent less breakage than those handled by other peeling devices, with little breakage of backs or skin across the backs.

Basically, the peeler consists of a series of vertically spaced tiers, each of which is made up of a number of pairs of drive rollers, connected by endless belts, and a number of peeling rollers, which rotate above but in contact with the belts. The surfaces of the peeling rollers and the endless belts have different coefficients of friction, so that shrimp will cling to one surface and slip on the other.

This friction differential causes the shrimp to rotate on the belt until loose ends of their shell are caught between roller and belt. The shells are then unwound from the shrimp, drawn off between the belt and roller, and disposed of.

The drive rollers oscillate with the power of the belt from side to side to bring the shrimp into contact with the peeling rollers. Rollers and belts are constantly washed and lubricated by running water. Across the discharge end of each tier of belts and rollers is an outturned lip that permits peeled shrimp to drop to the next lower level and finally onto a conveyor that takes them away from

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 ABSTRACTER: Kathryn L. Osterhaug

2.117 ALUMINUM IN TRAWLERS

Anonymous
Norwegian Fishing News 4, 7-8 (1957)

Aluminum long has been recognized as a structural material in shipbuilding, but it was not until the years immediately preceding 1939 that it became fully established as an alternative to steel. Since the war, the use of aluminum alloys in shipbuilding has greatly increased as a result of the introduction of new alloys able to withstand exacting marine conditions.

The two groups of alloys used in shipbuilding are the aluminum-magnesium group containing between 2 percent and 5 percent magnesium, used in the form of plate, and the heat-treated aluminum-magnesium-silicon group, extensively used in the form of extruded sections for stiffeners and beams.

The lightness, cleanliness, and durability of aluminum appeals to the trawler owner, and aluminum alloys are used on, above, and below the deck of vessels, as well as on the dock and in the processing factory.

Two characteristics most valued in a modern deep-sea trawler are high speed and great stability. To these ends, any weight saved, especially above the water line, is desirable. Aluminum alloys are approximately one-third of the weight of steel, and a structure designed on the basis of equal stiffness will weigh, on an average, 50 percent less than its steel counterpart. Add to the advantages of weight-saving their resistance to corrosion by sea water, and it can be seen why aluminum alloys are used for the masts, funnels, deck-houses, deck-pound boards, instrument panels, and the superstructure in trawlers.

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 ABSTRACTER: Kathryn L. Osterhaug

3.12 MICROBIOLOGY

Fischer, E.
Prace Morskiego Instytutu Rybackiego w Gdyni No. 8, p. 397 (1955) (Gydnia, Poland)
World Fisheries Abstracts 8, 25-26 (July-August 1957)

The bacterial content of ice stored in the refrigerated holds destined for refrigerating fish and of those in the ice extracted from fish boxes brought in with the catch of fish, and those in the ice washed in (i) distilled and sterilized water, (ii) 0.02% sodium hypochlorite were examined. From new ice stowed in the ice hold 1 ml. of ice water contained from 620 to 3,090 viable bacteria; the water from the ice in which fish were refrigerated contained from 190,000 to 10,800,000 bacteria, while washed ice contained from 3,500 to 286,000. The washing of the ice by means of disinfectants after a short time is only of mechanical value and gives results similar to those obtained after cleansing with distilled water. The bacteria isolated from the ice in the storage room belonged to the following genera: Micrococcus, Sarcina, Serratia, Flavobacter and Proteus. Polluted ice contained preponderating numbers of Pseudomonas and Achromobacter. As these possess the property of liquifying gelatine, of fermenting the carbohydrates and of reducing the nitrates, as well as wide limits of temperature for growth, they belong to the same genera which cause spoilage of fish. Ice destined for refrigerating fish ought to be carefully protected from external bacterial pollution. The ice once used for refrigerating fish should not be used a second time for the same purpose, as, owing to a structure transformation at the time of thawing, the bacteria penetrate to its depth and thus have the ability of continuing their existence. Washing such ice does not cleanse it which is proved by the fact that even after several washings, when the decrease in weight of the ice amounted to 37%, the number of microorganisms remained considerable, including the genera of bacteria, originating from the entrails of fish and from the slime, which produce decomposition of the flesh of fish.

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CONTROLLABLE PITCH PROPELLER

ALUMINUM IN TRAWLERS

MECHANICAL SHRIMP PEELER

BACTERIOLOGY OF ICE

2.117

For the fishing gear, aluminum alloys are being used because of their durability as well as their lightness; otter boards and "para otters," kite floats and plane floats, paravanes, trawl beams, and the spherical floats that are attached to the trawl headline are only a few of their current applications. Aluminum alloy spherical floats have been used extensively by the fishing industries of Northern Europe and North America; in 1948 an American firm claimed that floats manufactured in 1900 were still in use.

It is in the fish-hold that aluminum alloys make one of their greatest contributions to the efficiency of the trawler. Not only are materials and, therefore, money saved, but conditions are more hygienic, and as a result, the quality of the catch is maintained when aluminum is employed. Before the war, timber was the main material used in fish-hold construction; it was in 1945 that the first all-aluminum alloy fish-hold was built into a trawler. Since then, many trawlers have converted to aluminum fish-holds, using the metal for the lining, shell and pound boards, and bulkheads. Many vessels built today incorporate this feature. The present trend in the storage of fish in the hold is to place a single layer of fish on each shelf, an arrangement which necessitates the use of thousands of portable boards, rather than to store them in depth. The weight of these shelf boards and the division boards can be reduced to half by using aluminum alloy in the place of whiteboard. Moreover, aluminum alloy boards will not absorb sea water or fish slime and, in consequence, will neither rot nor warp, nor develop cracks to house the bacteria responsible for the deterioration of the catch.

Cleanliness of the fish-hold is of the utmost importance, and whereas timber needs frequent replacement because of rotting and splitting, aluminum will last many years with little or no deterioration. When aluminum structures do have to be replaced, their scrap value is considerable. It is with cause, then, that aluminum alloy shelving, stanchions, linings and rest bars in the fish-hold, and aluminum alloy pound boards on deck have proved to be popular with trawler owners.

Although aluminum is initially more expensive than steel or timber, its use in the last twelve years has extended throughout the trawler, and its enthusiastic reception by owner and crew alike would seem to assure its future in this field.

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2.114

can adjust the pitch to suit the load conditions of the boat, whether running full speed, light, or fully loaded or just holding its own against a tide.

Any propeller is subject to rough treatment and it is essential, therefore that a controllable pitch propeller be simple and rugged in design.

The controllable pitch propeller described in this article successfully has been installed in vessels all over the world.

A triangular control head, located on the center of the hub, slides fore and aft, actuated by a control rod running to the hydraulic pitch control unit on the engine through a bore in the tailshaft. Each side of the control head carries a heavy dowell that fits through a slide block into a groove in the flange on the propeller blade. A piston in the hydraulic unit controls the position of the control rod and the control head. Each position of the pitch control handle in the wheelhouse gives a certain propeller pitch. The shafting of this propeller with its internal control rod need not be heavier than a conventional solid shaft.

The propeller hub forms a shank that has an internal taper for mounting the propeller on the tailshaft. The propeller hub also forms the stern bearing. Excessive shock loads, such as are encountered when hitting a log, are transmitted directly to the hull without first going through the shaft. This makes it virtually impossible to bend a tailshaft.

It is a simple matter, moreover, to exchange bent or otherwise damaged propeller blades merely by dismantling the propeller cap, slipping out the damaged blade, and inserting a new one.

A simple, heavy-duty engine, combined with a hydraulic clutch and pitch control unit, eliminates the need for either a reduction gear or a reverse gear. For this reason, the propulsion unit can be supplied at a very reasonable cost.

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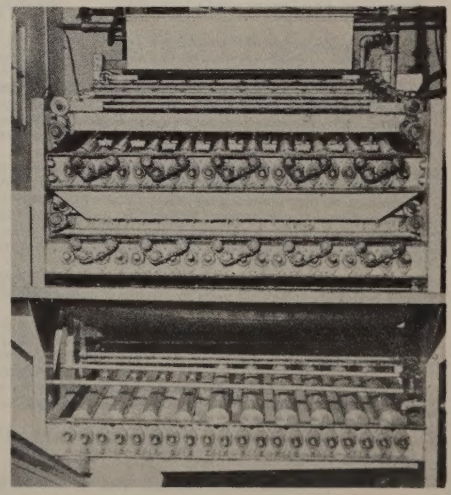
the machine. Each tier is mounted in the overall frame at an angle, so that shrimp and water move by gravity flow.

No auxiliary equipment is necessary in connection with the new peeler, which is driven by an electric motor.



Mechanism of the peeling machine is shown to good advantage in this head-on view.

2.3 CHLORINATION IN FISH PLANTS

Dussault, H. P. (Fishery Technological Station, Grande-Riviere, Quebec, Canada)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations No. 66, 13-14 (September 1957)

Chlorine is one of the most effective sanitizing agents for use in modern food plants. It is doubtful, however, that the full importance of the value of chlorination is adequately understood by fish plant personnel. Recently, some of the members of the fishing industry have studied chlorination as a means of solving some of their problems in sanitation. Automatic chlorination systems have been installed in a few fish plants. The advantages of chlorination, as gathered from a study of plant problems made in 1954, is presented by the author. This study is based on two plants that produce frozen fish fillets and blocks for the preparation of fish sticks.

Source of pollution.--Both the fresh and sea water used in plant number 1 contained significant counts of coliform bacteria--over 1800 coliforms per 100 ml. of water. In plant number 2, only the sea water was found to be polluted, owing to the plant location on the shore of a harbor into which raw sewage was emptied constantly. In both of these plants, coliform bacteria were found along the filleting lines and on the hands of some of the workers who were handling the fillets. Brines for dipping fillets showed significant numbers of coliform bacteria that had accumulated, owing to the constant passage of large quantities of fillets through the brine. In some instances, coliform bacteria were found on the packaged fillets, either fresh or frozen. These products were a menace to the health of consumers. Fish slime, which is an excellent culture media for bacteria and which is difficult to remove, had accumulated on everything with which the fish came in contact along the filleting lines. A strong and unpleasant fishy odor prevailed throughout these two plants.

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ABSTRACTER: Martin Heerdt

3.12 ANTIBIOTIC RESIDUES IN SHELLFISH AFTER COOKING

Benarde, Melvin A. (Seafood Processing Laboratory, University of Maryland, Crisfield)
Journal of the American Dietetic Association 33, 1145-1149 (November 1957)

A recent study of the antibiotic preservation of fresh crab and oyster meats revealed the presence of biologically active residues in excess of those presently allowed for fresh poultry. Such residues would at this time prohibit antibiotic treatment from attaining commercial utility. To determine whether the heat of frying--as in preparation of crab cakes and fried oysters--is sufficient to destroy the antibiotic residues, further studies were undertaken.

Method and material.--Crab cakes were prepared from freshly picked, regular grade meat of the blue-crab, Callinectes sapidus Rathbun, previously dipped for 2 minutes in antibiotic solutions. They contained sea food seasoning, Tabasco sauce, whole beaten egg, and bread. Bread crumbs were applied before the cakes were fried in vegetable oil.

Select and extra-select shucked oysters, Crassostrea virginica, were dipped in whole beaten eggs, rolled in bread crumbs, and fried in vegetable oil.

Both items were fried until declared "done" by the technician. Since no other criterion was employed, the procedure represents "the usual" and not a laboratory concoction.

Several sizes of crab cakes and oysters, containing various concentrations of chlortetracycline or oxytetracycline, were prepared to assess the heat penetration and its effect on the stability of the antibiotic.

Results and discussion.--The largest crab cake required the longest time (14½ minutes) to reach the "done" stage, with an internal temperature of 143° F. The smallest cake heated most rapidly; it was "done" in 5 minutes, with an internal temperature of 176° F. A temperature of 176° F., arrived at either within 5 minutes or after 14½ minutes, was not sufficient to reduce the antibiotic concentration to negligible levels. In fact, both groups contained values above 1 p. p. m.

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ABSTRACTER: June H. Olden

3.12 THE EFFECTS OF CERTAIN ANTIBIOTICS ON THE PRODUCTION OF TRIMETHYLAMINE AND HYDROGEN SULPHIDE BY BACTERIAL ENZYMES

Castell, C. H. and Greenough, Maxine F. (Fisheries Research Board of Canada, Technological Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 14, 771-774 (September 1957)

General.--Food preservatives act in different ways to prevent or retard spoilage caused by bacteria. They may be bactericidal or bacteriostatic, or they may only interfere with some of the chemical activities of bacteria. Certain antibiotics recommended for the preservation of fish do have a marked bacteriostatic action. However, sodium nitrite is the preservative now most extensively used for fresh fish in Eastern Canada. Over 90 percent of the fresh fillets shipped into the interior probably are treated with nitrite.

Two enzymic reactions concerned with the spoilage of certain sea fish are: (1) the reduction of trimethylamine oxide to trimethylamine, and (2) the reduction of organic sulphur compounds to hydrogen sulphide. A tentative suggestion has been made to use the trimethylamine content as one of the main criteria in determining the quality of cod and haddock. It has been found, however, that by analyzing for the trimethylamine content of spoiled nitrite-treated fillets and of fresh fillets, no appreciably larger amount of trimethylamine is found in the spoiled fillets than in the fresh.

This research is said to have for its purpose, then, the determination of the effects of certain commercial antibiotics on the reduction of trimethylamine oxide and cysteine by bacterial enzymes.

The antibiotics used were: (1) chlortetracycline, (2) oxytetracycline, (3) polycycline, and (4) nisin.

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ABSTRACTER: Joseph C. Blucher

3.12 PRESERVATIVES -- NITRITES

Trzesinski, P. and Zachorowski, T.
Prace Morskiego Instytutu Rybackiego w Gdyni No. 8, p. 375 (1955) (Gdynia, Poland)
World Fisheries Abstracts 8, 29-30 (July-August 1957)

To discover the effect of $NaNO_2$ in ice on the keeping quality of cod, experiments were conducted aboard cutters sent to sea under the control of a scientist. Fish caught in 1 day in 2 hauls were divided into 4 test lots, each consisting of 6 boxes and each box containing 40 kg. (88 lb.). The 4 test lots contained cod treated as follows: (1) uneviscerated cod, stowed with $NaNO_2$ ice; (2) uneviscerated cod, stowed with ordinary ice (control); (3) cod eviscerated immediately after catch, without beheading and stowed with $NaNO_2$ ice; (4) cod eviscerated immediately without beheading and stowed with ordinary ice (control). The stowage of fish in ice in the boxes was carried out according to established practice. The boxed fish were stored in the fish hold at a temperature of 4° to 6° C. (39.2° to 42.8° F.). On the 5th day after catch, they were unloaded and deposited in a cold room at a temperature of -3° C. (26.6° F.). On the 8th day, they were brought to the laboratory, which had a temperature of 14° to 20° C. (57.2° to 68° F.) and starting from this, organoleptic tests, bacteriological and chemical analyses were carried out.

The following conclusions could be drawn from the above experiments: (i) ice prepared from a 0.15% solution of $NaNO_2$ preserves fish better than ordinary ice (without $NaNO_2$). The $NaNO_2$ ice extends the keeping time of eviscerated, unbeheaded cod by 4 days as determined bacteriologically and by 4 to 5 days as determined by chemical analysis. (ii) The uneviscerated cod shows, after storage for 12 days both with $NaNO_2$ and ordinary ice, a cohesive muscular tissue, in spite of the putrescent smell and in particular the intense putrid smell of the ventral cavity. The figures from bacteriological and chemical analyses do not confirm such a state of decomposition. The cause of

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CHLORINATION IN FISH PLANTS

ANTIBIOTICS VERSUS BACTERIAL ENZYMES

ANTIBIOTICS FOR SHELLFISH

SODIUM NITRITE ICE

3.12

Experimental. -- To test its inhibition of bacterial enzyme action, each antibiotic was added to a preparation of washed bacterial cells in a buffer solution containing the proper substrate. The rate of enzyme action was compared with a system that did not contain the antibiotic. Trimethylamine was measured colorimetrically by the method of Dyer and the hydrogen sulphide by the method of Fischer as modified by Brenner and coworkers.

For different kinds of bacteria and at varying concentrations of antibiotics, none of the four antibiotics at any concentration used in the experiments caused any decrease in the rate of reduction of trimethylamine oxide to trimethylamine.

Similarly, in the reduction of cystine by E. coli, concentrations of 50 p. p. m. of either chlortetracycline or oxytetracycline, the results were--no retardation.

Discussion. --Under acid conditions sodium nitrite can be either bactericidal or bacteriostatic. However, under slightly acid, neutral, or alkaline conditions it has little or no effect on the growth of fish-spoiling bacteria. Under the latter conditions it does inhibit the enzymic reduction of trimethylamine oxide to form trimethylamine and the reduction of organic sulphur compounds to form hydrogen sulphide. It seems, therefore, that the chief value of nitrite is that it changes the pattern of spoilage by eliminating the production of certain unpleasant volatile compounds.

Since it is desirable to have some method of measuring the quality of fish flesh, the determination of trimethylamine seems to be a very acceptable one. It can be used where certain antibiotics are used as preservatives, but not where sodium nitrite has been used.

3.12

this is probably due to decomposition products present in the ventral cavity which diffuse into the muscle. (iii) Under experimental conditions, the keeping time of eviscerated cod was 17 days--3 days longer than that obtained in practice i. e., 14 days. (iv) The bacterial count of flesh of fish stored in ordinary ice and which was still edible (Class C of freshness), was 1,000,000/g. flesh. The bacterial count of fish flesh stored with $NaNO_2$ ice and in the same state of freshness as above was 100,000/g. In the case of fish which had showed signs of putrefaction, the bacterial counts of the flesh were, in the case of fish stowed with ordinary and $NaNO_2$ ice, 8,000,000/g. and 1,000,000/g. resp. It is clear that $NaNO_2$ has bacteriostatic effect. (v) The exterior aspect of fish stored with $NaNO_2$ ice is worse than that stored with ordinary ice. The skin of cod stored with $NaNO_2$ ice assumes a grey color. In some cases, a slight swelling of about 1 to 2 mm. is observed on the skin. The meat around the vertebral column assumes a pink color and, in some cases, it is quite strongly pink.

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To overcome these conditions, the author recommended the installation of automatic chlorinators that add chlorine directly to the incoming water so as to maintain a residual concentration of 3 to 5 parts per million (p. p. m.). The author recommended that, during clean up periods, the chlorine concentration be increased to 30 p. p. m. and that all workers dip their hands in a solution containing 100 p. p. m. of chlorine before beginning work and particularly after each visit to the lavoratory.

The authors recommendations were followed. On a second visit to each of these two plants, all sources of water and even water from the polluted harbor were found to be absolutely free of coliform bacteria. As a consequence, there was almost complete absence of these bacteria on the hands of the workers, on the filleting lines, in the brine baskets, and in the finished product. Chlorine proved to be an excellent bactericide and a most effective cleaning and desliming agent. Fillet boards were free of slime, and cement floors were less slippery as a result of slime removal. In addition, the fishy odor within the plant had disappeared and had been replaced by the fresh odor of chlorinated water.

The plant managers were very pleased with the simplicity of automatic chlorination and with the results obtained. Workers were pleased by the improved sanitary conditions within the plant, and morale was at a high level. In conclusion, automatic chlorination removed the unsanitary conditions within these plants.

3.12

Nine to twelve minutes was required to fry comparatively large oysters. Being relatively thin, however, they attained temperatures of 215° and, in one instance, 280° F. In all instances, the residuals were less than 1 p. p. m.

Cooking frozen crab. -- As a sizable quantity of fresh crab meat is used commercially to prepare frozen crab cakes, studies were undertaken to discover what residues might be expected after cooking according to label directions, if the crab meat had been treated with antibiotics. One set was cooked according to label directions, whereas a second set was cooked as might be done by persons not following directions specified on the wrapper.

Deviled crab: The larger deviled crab cakes in the preheated oven (according to specified directions) attained 156° F. after 20 minutes (specified time). Those in the cold oven (not according to directions) reached 126° F. after an equal period.

Crab: Crab cakes in a preheated oven reached 170° F., whereas the cold-oven mates attained 145° F. after 8 minutes at 300° F. --the conditions specified on the wrapper.

When one considers the assay data obtained from antibiotic-treated crab cakes of size and internal temperature similar to those of untreated commercial cakes, it is reasonable to suggest that similar antibiotic residues could be expected.

Summary. -- Crab and oyster meats treated with various concentrations of chlortetracycline or oxytetracycline, two broad-spectrum antibiotics, were found to contain biologically active residues of these antibiotics after frying in the usual manner.

In addition, untreated, precooked, frozen, and deviled crab and crab cakes, obtained from retail outlets, were found to attain internal temperatures of a magnitude suggesting that biologically active residues of antibiotic could be present when the food is eaten, should these products have been so treated.

3.237 ABSENCE OF THERMAL POLYMERS IN POTATO-CHIP FRYING OILS

Melnick, Daniel (The Best Foods, Inc., Bayonne, New Jersey)
The Journal of the American Oil Chemists' Society 34, 351-356 (July 1957)

The problem of thermal polymers of acceptable flavor in potato-chip-frying oils has been discussed from the standpoint of potentiality of such polymers forming during commercial frying operations. Publications on heat-abused oils have been critically reviewed, and many of these have been shown to yield findings irrelevant to practical operations. Conclusions based upon such studies should not be extended beyond the scope of the findings reported.

The change in iodine value has been shown to constitute a simple and highly precise method to determine for survey purposes whether thermal polymers may have formed in the oils used in a given industry. Such a survey has now been completed covering the operations of 89 different potato chip manufacturers, using all types of frying oils. A 1% decrease in the iodine value of the oils in commercial use has been noted. Whereas this change in iodine value is statistically significant, it is shown to have no nutritional significance.

The constancy in composition of the frying oils--heated as compared to fresh--and the results of physico-chemical studies, noted in a related study Melnick et al. (1957), support the present conclusion that thermal polymers are absent from the oils employed in the commercial manufacture of potato chips.

Author's summary

3.4 FRACTIONATION OF WOOD SMOKE AND THE COMPARISON OF CHEMICAL COMPOSITION OF SAWDUST AND FRICTION SMOKES

Husaini, Saeed A. and Cooper, G. E. (Rath Packing Company, Waterloo, Iowa)
Food Technology 11, 499-502 (October 1957)

This study was made to analyze, fractionate, and classify wood smoke into desirable and undesirable components and to compare the chemical composition of wood smoke generated by different methods. A homogeneous sample of sawdust was collected and stored to provide uniform subsamples for use throughout this study.

Smoke generation by composition.--Sawdust was brought to 50 percent moisture, loosely packed in 36-inch by 3-inch diameter iron pipe, and allowed to burn from the top. The production of smoke was aided by the introduction of air into the bottom of the iron pipe. The sawdust smoke that was generated was condensed in a train of four traps immersed in a mixture of alcohol and dry ice at -80° C.

Smoke generation by friction.--Rectangular blocks of maple wood were used to generate friction smoke by holding them in position against a rotating metal disc with the aid of compressed air. This friction smoke was also condensed at -80° C.

Steam distillation to obtain volatile acids.--Both sawdust smoke and friction smoke were steam distilled for 45 minutes, and the steam distillate and non-steam distillate volatile acids were titrated with sodium hydroxide to obtain the amount of total acids. Volatile acids from the steam distillation were converted into sodium salts, made up to volume, and an aliquot of these salts was evaporated to dryness, acidified with sulfuric acid, extracted with ethyl ester, neutralized with

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ABSTRACTER: Martin Heerdt

3.335 TUNA WITH NOODLES

Anonymous
Food Engineering 29, 184 (October 1957)

Instructions for a tuna fish-with-noodles product to be frozen in 8 ounce aluminum trays for sale as an oven casserole of the heat- and eat-type are as follows:

Prepare a white sauce from 4 pounds of flour, 4 pounds of shortening, 6¾ ounces of salt, ½ ounce of ground pepper, 1 teaspoon of cayenne pepper, and 48 pounds of milk.

Blanch 8 pounds of noodles in about 6 gallons of water at 212° F. and 6 ounces of salt.

Drain the blanched noodles and blend them with 14 pounds of canned tuna fish, the white sauce prepared above, and 1½ pounds of grated onions.

Fill this blend onto aluminum foil trays.

Mix 1 pound of melted shortening and 4 pounds of bread crumbs. Sprinkle this mixture over the trayed product and freeze.

Label the packaged trays with instruction for baking the product in the oven in preparation for serving.

ABSTRACTER: Martin Heerdt

3.61 INCREASING DEHYDRATION EFFICIENCY

Walter, Leo
Food Manufacture 32, 516-519 (November 1957)

Factors and figures needed by the plant engineer to assess the efficiency of his equipment are discussed in this article.

The following factors have to be considered for warm-air drying: (1) critical temperature of the material to be dried, (2) time allowed for producing the required dryness, (3) moisture content of ingoing and outgoing material, and (4) output from the drying plant and drying cost per unit weight of material at the desired moisture content of the end product.

The factors that influence dryer performance are: temperature, humidity, speed of air movement, and--for continuous drying--rate of movement of material.

In any type of dryer, the quality of drying depends on balancing heat input and rate of evaporation at any particular moment. The means of influencing rate of drying, whether by hand or automatic control, are: (1) change of temperature, (2) change of humidity of air, (3) change of velocity and direction of air, relative to the material, (4) change of air volume, (5) change of conveyor speed or of speed of material through a continuous dryer, and (6) change of moisture content of material when entering the dryer. Each of these factors can be controlled to achieve the correct rate of drying and the desired final moisture content.

Comparing thermal efficiency.--The usual criterion of thermal dryer efficiency is the term "pound of steam per pound of moisture evaporated." The better term, which takes into account

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ABSTRACTER: June H. Olden

FRYING OILS

PRECOOKED FROZEN TUNA DISH

SAWDUST VERSUS FRICTION SMOKES

DEHYDRATION EFFICIENCY

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steam pressure and quality of fuel from which steam has been generated, is "B. t. u. per pound of moisture evaporated."

Two ways are open for a works engineer to arrive at reliable steam consumption figures: by measurement of steam or condensate from heating surfaces or by simple calculation. In the measurement of condensate, flash steam must be taken into account; that is, the weight of evaporated condensate that forms when "superheated" water is released from a condensate line to the atmosphere, the weight of which has to be added to the weight of liquid condensate. Thermal efficiency is measured by the amount of moisture evaporated per pound of steam of the same pressure and dryness.

Introducing improvements. -- To improve the efficiency of hot-air dryers, all external surfaces should be insulated. The temperature and humidity of the air and also the air velocity should be measured at different points in the machine. Utmost cleanliness of the outer and inner surfaces of heating coils must be secured, and efficient removal of condensate and air should be carried out. Tests will reveal the best applicable air volume, humidity, and speed of circulating fans.

The heat required for the evaporation of moisture from the goods (called the effective heat) may range from 40 to 70 percent of the total heat input. The sensible heat utilized for warming up the goods may range from as little as 3 to 50 percent of the total heat input. The calculation for hot-air drying is based on the amount of moisture to be evaporated by correct rate of heat input and to be carried away by the right amount of air.

Calculating the heating surface. --If the amount of heat required is known and a steam pressure and a temperature are chosen that provide a temperature differential between drying temperature and steam temperature, the heating surface can be calculated. This heating surface will depend on air quantity and velocity and on heat transfer through the heating coil. The coefficients for heat transfer from steam to air are given for each type, size, and quantity of pipe.

Conclusion. --What must be realized by each user of a drier is that no universal drier exists that could handle the great diversity of food products to be dried. Great care therefore has to be exercised when using a drying installation for a different material than that for which it has been designed. Where fuel, heat power, and labor can be wasted, and where overall drier efficiency is very low, replacement by modern drying plants, designed for the actual working conditions, will be a sound capital investment.

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sodium hydroxide, recovered in the aqueous layer, acidified, and chromatographed on a silicic acid column. The method used for the chromatographic separation of component acids was a modification of the methods of Ramsey and Paterson (1945) and of Bulen, Varner, and Burrell (1952).

Determinations. -- Total steam volatile and non-steam volatile phenolic compounds, after extraction according to the scheme of Braus, Middleton, and Ruchhoft (1952), were determined colorimetrically by a modification of the 4-aminoantipyrine method of Ettinger, Ruchhoft, and Lishka (1951). An aliquot each of the steam distillate fraction and of the non-steam volatile fraction was used in the determination of total carbonyl compounds as 2, 4-dinitrophenyl hydrazones according to the method of Iddles and Jackson (1934). The smoke condensate obtained by condensing smoke at -80° C. was assayed for water by distilling a known weight of the smoke condensate with 150 ml. of xylene previously saturated with water.

Fractionation of smoke. --Sawdust smoke was partially condensed and fractionated by passing it through a train of four condensers at -18° C., -5° C., 4° C., and 15° C., for each separate run. Over 90 percent of the condensate accumulated in the first two condensers. The uncondensed portion of the smoke was used to smoke pieces of cured hog bellies. Smoke condensates obtained by condensing smoke at each of the four temperatures were steam distilled separately with steam at the rate of 800 ml. per hour. The distillate obtained was also used for smoking cured hog bellies.

Results. --The steam volatile portion of either sawdust smoke or friction smoke condensate gave a distillate that contained most of the smoke odor and flavor, whereas the non-steam volatile portion retained most of the dark brown smoke color and only negligible amounts of smoke odor and flavor. Most of the acids in sawdust smoke and friction smoke were steam volatile. A comparison of the steam volatile acids showed that acetic acid occurred in the largest amount with formic acid in the next largest amount. Friction smoke was richer than sawdust smoke in the desirable smoke compounds. Friction smoke contained less moisture, four times the amount of steam volatile acids, and eight times the amount of steam volatile aldehydes and ketones than were found in sawdust smoke. Friction smoke also contained larger amounts of steam volatile phenolic compounds. The non-steam volatile portion of both sawdust smoke and friction smoke was undesirable for smoking cured hog bellies.

3.2380 FACTORS AFFECTING QUALITY OF PREPACKAGED MEAT. I. PHYSICAL AND ORGANOLEPTIC TESTS. C. ORGANOLEPTIC AND MISCELLANEOUS PHYSICAL CHARACTERISTICS OF PRODUCT

Clause, Warren E.; Ball, C. Olin; and Stier, Elizabeth F. (Rutgers University, New Brunswick, New Jersey)
Food Technology 11, 363-373 (July 1957)

This is a report in part of a study made to learn the effect of prepackaging on meats.

Effect of type of packaging material.--Ground lean beef, lamb, and pork samples in film packages were stored at temperatures of 32° to 40° F. and examined at approximately weekly, or in the case of pork, shorter, intervals for a period of three to four weeks. Better flavor and total organoleptic quality were shown when they were stored in films having a relatively low oxygen and water vapor permeability, than when they were stored in films having relatively high permeability. Cut and ground lamb samples, both containing 15 to 20% fat, were stored over a 7 to 10 day period at 35° to 43° F., and examined either daily or every two days. Over a given storage period, flavor of samples stored in MSAT80 cellophane, coated side out, pouches, sealed at 26 to 28 inches of vacuum, was about equal to that of samples wrapped, but not sealed, in the same material and of samples in cellophane-pliofilm laminate pouches, sealed at 27 to 29 inches of vacuum.

Fresh vs. frozen meat.--Three sets of two consecutive runs each--the first set with beef, the second and third with fresh hams--were made to study the effects of freezing meat before packaging. In the second run of each set, meat of similar origin to that used in the first run, and slaughtered at the same time, was used but this meat was frozen in chunks on the packaging day of the first run and held at from -9° F. to -15° F. until it was thawed on the day before it was packaged. Cut samples were used in all runs. In each of the first two sets of runs, flavor values of samples in the first run were

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4.82 FAT IN FEEDS

Anonymous
Journal of Agricultural and Food Chemistry 5, 896-897 (December 1957)

Use of supplementary fats in animal feeds is relatively new. Yet in the short span of five years, byproduct tallows and greases from the meat packing and rendering industries have found a major market in feeds.

Today, an estimated 50 percent of all manufactured poultry feeds and 25 percent of all livestock feeds contain supplementary fat, according to the American Meat Institute Foundation. Usually added to the extent of 2 to 8 percent, fat offers big advantages. It: (1) makes the feed more palatable, (2) enhances its digestibility; (3) increases the animal's growth and its weight gain per pound of feed, (4) reduces the dustiness of the feed, giving, in turn, greater ease in handling in the mill, decreased loss through dusting, and greater convenience in handling and shipping in bulk, (5) improves appearance of the feed, giving it a brighter, richer color; (6) decreases wear on mixing and handling equipment, through lubricating action; (7) increases ease of pelleting, and (8) with the help of antioxidants, protects fat-soluble vitamins during feed storage.

Poultry feeds.--Stabilized fats in feeds won their first big acceptance in poultry feeds. One reason is that poultry rations can be controlled much more easily than those of livestock. It is much easier to determine whether the fat really is benefiting chickens.

The Agricultural Experiment Station of Illinois reports that when broilers receive feed containing about 7-percent animal fat, their rate of weight gain is increased by 20 percent. With this ration, also containing about 25 percent protein, broilers are able to gain one pound on only 1.93 pounds of pounds of feed. Today, the usual level of fat in commercial broiler feeds is about 3 percent.

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 ABSTRACTER: Kathryn L. Osterhaug

4.61 CONTROL OF RANCIDITY IN STORED FISH. V.

Boyd, J. W., Schmidt, P. J., Idler, D. R.; and Tarr, H. L. A. (Fishery Technological Station, Vancouver, B. C., Canada)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 108, 21-23 (September 1957)

In this study various antioxidants and mixtures of antioxidants tabulated below were incorporated into the minced flesh of red spring salmon. Ascorbic acid and ethyl gallate were dissolved in water and added as aqueous solutions. Butylated hydroxyanisole and α-tocopherol were dissolved in propylene glycol and added as propylene glycol solutions. Control samples of salmon received either added water or added propylene glycol without antioxidant. Each 96-gram (3½ ounce) portion of minced salmon received 4 milliliters (0.14 fluid ounces) of antioxidant solution.

Samples of salmon prepared as above were placed in small polyethylene bags, which are oxygen permeable, and water vapor impermeable, pressed to approximately ½-inch thickness, heat sealed, quick frozen, and stored at -4° and +16° F. for four months.

Oxidative rancidity was followed by peroxide value tests and changes in the surface color of the thawed samples. Changes in the color of samples of minced red spring salmon after storage were determined by the use of a Gardner automatic color-difference meter or tristimulus colorimeter. This colorimeter measures color on the basis of brightness or amount of light in the color, hue or kind of color, and saturation or richness of color and defines the color relative to a standard. For each color measured, this instrument gives Rd, a, and b values. "Rd" values are a measure of luminous reflectance. "a" values are a measure of redness when plus, gray when zero, and greenness when minus. "b" values are a measure of yellowness when plus, gray when zero, and blueness when minus. By the use of these three values, tristimulus values can be calculated. The total color difference ΔE can also be calculated from the Gardner data.

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 ABSTRACTER: Martin Heerdt

4.90 PALATABILITY OF CHICKENS FED DIETS CONTAINING DIFFERENT LEVELS OF FISH OIL OR TALLOW I. EVALUATION BY A CONSUMER-TYPE PANEL. II. EVALUATION BY A TRAINED PANEL

Carlson, Doris; Potter, L. M.; Matterson, L. D.; Singsen, E. P., Gilpin, G. L.; Redstrom, R. A.; and Dawson, E. H. (University of Connecticut, Storrs)
Food Technology 11, 615-620 (December 1957)

Fats and oils now have become important in the formulation of broiler feeds. The flesh of poultry, however, is subject to off-flavors imparted by certain feed ingredients, such as fish oil.

Purpose.--An attempt was made in this study: (1) to establish the amounts of certain commonly used fats and fish oils that could be fed safely without adverse effects on the flavor of broilers, (2) to determine if off-flavors due to fish oils could be eliminated by the presence of antioxidants in the broiler feed, and (3) to determine if off-flavors due to fish oils could be eliminated by feeding a finishing ration without added fish oil for 3 weeks before marketing.

Experimental.--The palatability of chickens fed different experimental diets was evaluated (a) by the responses of consumers without taste panel experience who cooked the chickens in their homes according to their own methods subject to certain restrictions and (b) by the score responses of a trained panel who tasted chicked cooked in the laboratory under carefully controlled conditions.

The consumer panel scored flavor, aroma, and tenderness on the basis of 3-point scales. They then recorded comments on any marked quality characteristics. Findings were reported in terms of percentages based on the off-flavor reports. The trained panel recorded comments on moistness, tenderness, chicken flavor, and off-flavor on the basis of 5-point rating scales. Findings were evaluated by analysis of variance, and significant differences between means were determined.

The overall conclusions drawn from the consumer study and the laboratory study were similar with respect to the amount of menhaden fish oil or tallow that can be added to the diet without impairing the flavor of broilers.

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 ABSTRACTER: Martin Heerdt

PREPACKAGED MEAT QUALITY

ANTIOXIDANT CONTROL OF COLOR

FATS IN FEEDS

FISH OIL IN POULTRY RATIONS

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Results.--The results of these studies with samples of salmon that were stored for four months at -4° and +16° F. are tabulated below. The results obtained after two months were similar in trend but of lesser magnitude. Overall changes were considerably greater at +16° than at -4° F. An increase in peroxide value was not always accompanied by an identical shift in all of the various components used in determining color.

Changes in color and in peroxide values of the oil in frozen red spring salmon*

Treatment	Stored at +16°F.					Stored at -4°F.				
	ΔE	ΔB	ΔH	ΔP	P.V.	ΔE	ΔB	ΔH	ΔP	P.V.
Water	22.7	12.0	-6.9	-37.0	15.5	9.1	1.3	-0.6	-28.1	3.4
Propylene glycol	26.0	7.4	-11.0	-36.2	39.3	14.6	0.6	-2.0	-35.4	7.5
Ascorbic acid 0.04%	11.5	0.8	-2.4	-26.7	0.5	7.0	-0.8	1.7	-26.9	0.5
Ascorbic acid 0.04% + BHA 0.02%	11.6	-2.8	-0.6	-24.9	39.1	7.9	-2.4	0.7	-22.8	1.7
Ascorbic acid 0.04% + ethyl gallate 0.02%	14.0	-3.0	-0.3	-30.0	1.0	11.0	-2.5	0.4	-29.2	7.4
Ascorbic acid 0.04% + α-tocopherol 0.02%	15.9	-0.3	-4.4	-29.1	41.8	11.1	-4.4	0.5	-26.2	6.0
BHA 0.02%	16.5	-0.9	-4.9	-25.3	65.0	11.7	-0.8	-2.3	-26.9	14.7
Ethyl gallate 0.02%	14.9	-3.5	-0.2	-32.0	9.2	11.3	-2.7	0.3	-29.1	1.7
α-tocopherol 0.02%	25.6	3.3	-10.1	-35.4	67.6	13.7	-1.9	-2.0	-32.0	14.0

*ΔE = Total color difference in N.B.S. units as compared to the original fresh sample.
ΔB = Change in percentage luminous reflectance.
ΔH = Change in dominant wavelength (millimicrons).
ΔP = Change in percentage purity.
P.V. = Peroxide value (ml. 0.002 N sodium thiosulphate per gram of oil).
A minus sign indicates a decrease, and absence of such sign an increase, in a given value as compared with that of the original sample.

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slightly higher over most of the storage period than those in the second run. In the third set of runs, flavor values of lean samples in the second run were slightly higher in the first 2 weeks of storage than they were in the first run, but about the same in the third and fourth weeks. Flavor values of "fat" samples were about the same in both runs over the entire storage period.

Effect of vacuum.--Panel ratings for flavor of lean and "fat" (50% lean-50% fat) ground lamb samples and of similar pork samples, stored in 307 x 306 cans, were about the same over a 2-week storage period when the cans were sealed at 15 inches of vacuum as they were when the cans were sealed at 27 inches of vacuum. Lamb samples carried beyond 2 weeks showed better results in the 27-inch vacuum storage.

Effect of fat.--When containers of low fixed gas permeability, sealed under 27 to 29 inches of vacuum were used, the presence of some fat in the meat seemed to cause slightly better retention of overall acceptability of the meat during storage of 3 to 4 weeks at temperatures of 34° F. to 42° F. than was found in all-lean samples.

Effect of temperature.--During storage periods of 3 to 4 weeks, temperatures close to 32° F. prolong desirable flavor of meat better than temperatures around 40° F. Organoleptic panel evaluations of flavor of lean ground lamb samples, stored in cans sealed at 27 inches of vacuum, were about the same during a 3-week storage period at 36° F. when the samples were stored immediately after packaging as when they were held at room temperature for 20 hours after packaging. "Fat" samples of ground lamb had a slightly better flavor during storage when they were stored immediately after packaging.

Effect of light.--There was no marked effect of light on any of the organoleptic factors, other than color of cured ham stored at 38° F. even up to 21 days, except for an acetic-acid-like odor which developed in samples packaged in unsealed trithene pouches exposed to 30 foot candles of light. This same odor was not noted in cured ham samples packaged in the same film, unsealed, but stored in the dark at the same temperature as the samples exposed to the light. The odor was present only in raw samples.

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Chickens that received 0.5 percent menhaden fish oil with or without diphenyl-para-phenylene diamine (DPPD) in addition to the 0.5 percent DPPD in the basal diet were not significantly different in quality from control chickens that did not receive fish oil. Chickens that received 1 or 2 percent menhaden fish oil with or without DPPD had significantly more off-flavor than control chickens that did not receive fish oil. If 0.5, 1, or 2 percent tallow was added to the diet, the chickens had a very slight or no observed off-flavor.

The consumer study found that the addition of 1 percent or 2 percent menhaden oil with or without DPPD in the basal diet resulted in fishy off-flavors. The amount of off-flavor that resulted in chickens on diets containing 0.5 percent menhaden oil without DPPD was similar to the amount of off-flavor that resulted in control chickens on the basal diets. The addition of 0.5, 1, or 2 percent tallow to the basal diet resulted in no objectionable off-flavors in the chicken according to the consumer study.

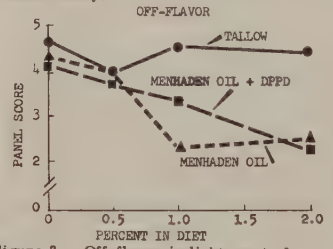

Figure 3.--Off-flavor in light meat of chicken oven-cooked at 325° F.

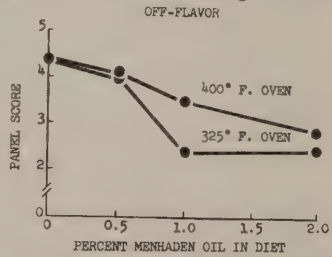

Figure 4.--Off-flavor in light meat of chicken oven-cooked at 325° F. and 400° F.

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U. S. Department of Agriculture scientists report that turkeys gain additional weight per pound of feed on rations containing 8 percent stabilized fat. The extra growth response may last for 6 to 10 weeks, depending on the type of turkey. At the end of a 10-week feeding test, broad-breasted white poults that received feed containing 8 percent stabilized fat weighed 5.6 pounds after eating only 13.4 pounds of feed. Those receiving feed with no additional fat, weighed, on the average, only 5.1 pounds after eating 15.1 pounds of feed. In commercial turkey feeds, fat is usually added to the extent of 4 to 5 percent.

Cattle feeds.--Fats also are becoming increasingly popular in feeding cattle. In feeds for beef cattle, usually about 3 percent fat is added. The animal, as a result, gets about 0.8 to 1.0 pound of stabilized fat a day.

All indications point to increasing use of fats in feeds in the future. Higher percentages of fats will be added. Particularly among poultry and hogs, the trend definitely is toward the use of higher energy feeds.

Some researchers say that levels up to 18 percent fat are economical in poultry feeds, although percentages up to only about 10 percent readily can be handled in existing mixing equipment. Recently, a large commercial feed manufacturer developed a way of pelleting a poultry feed containing 8 percent added fat. (Formerly, because of excessive softening of the pellets, the upper limit was about 3 percent.)

3.26 10 WAYS TO INCREASE SALES AND PROFITS WITH FROZEN SEAFOODS

Anonymous
Quick Frozen Foods 20, 84-85 (August 1957)

1. Display frozen seafoods prominently. Frozen seafood products should be placed together, both cooked and uncooked, so that the housewife has a good selection in a single grouping. This also encourages the sampling of a number of varieties of seafood, contributing to more frequent use. A picture of an angler on the point-of-sale material is valuable in attracting the attention of men shoppers. A survey taken by a major packaging company revealed that a much higher percentage of men shoppers buy fish on impulse than women.

2. Even in its frozen state, fish is an extremely perishable product. Avoid risking flavor loss--promptly putting such items under zero refrigeration. If not mishandled, frozen fish is actually fresher than fresh fish and therefore has a correspondingly better flavor. Be careful not to stack any of the product over the freezing line shown on the cabinet, because frozen seafoods begin to lose flavor when held at even only a few degrees above zero.

3. Keep a reserve supply of the fast-selling seafoods in a backroom storage box. Out-of-stock means lost sales and profits for everyone. Unusually heavy Friday sales may come as a surprise with no means of reordering until the next week.

4. Don't wait for the packers to come around with promotions but feature your own seafood "specials" every week, just as you would with meat, vegetables or canned foods. This reminds customers of seafoods and conditions them to come to your store regularly to purchase their seafood needs.

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COMMERCIAL FISHERIES ABSTRACTS VOL. XI NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

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4.91 SEAFOOD--AN AID IN THE DIET OF ATHEROSCLEROTIC PATIENTS

Nelson, Averly M.
Pacific Fisherman 55, 35, 37 (December 1957)

Foremost among the health problems needing solution in the United States is the disease atherosclerosis, commonly called "hardening of the arteries."

From studies made in selected countries, it is evident that atherosclerosis is more prevalent among people having high levels of cholesterol in the blood. The level of cholesterol is directly related to the amount of fat consumed.

All fats are not similar in action. The unsaturated fats exert a lowering action on the level of cholesterol in the blood, whereas the saturated fats tend to increase the level. The unsaturated fats are those containing double bonds. Examples are corn oil, safflower seed oil, nut oils, and fats of most fish.

The commonly used meats in the American diet, and to a lesser extent poultry, have saturated fats. Unless these meats are prepared in such manner that much of the fat is lost before consumption, they may exert an atherosclerotic effect.

Recent research has shown that it takes three tablespoonfuls of corn oil to neutralize the blood-cholesterol raising effect of one tablespoonful of butter, animal fat, or hydrogenated vegetable oil. This might suggest falsely that the remedy lies merely in increasing the consumption of unsaturated fats. A diet high in fat, either saturated, or unsaturated causes, however, an increased tendency for the blood to clot; so although the level of blood cholesterol might be decreased, blood vessels could clot more readily, and thus the hazard actually would be increased.

The therapeutic diet that the author has used for atherosclerotic patients for eight years obtains about 20 percent of its calorie content from fat. All fats are reduced in this diet. Meats are prepared by low-fat cookery but still contain from 25 to 30 grams of fat in every eight ounces, or two

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COMMERCIAL FISHERIES ABSTRACTS VOL. XI NO. 3 PAGE 15
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ABSTRACTER: Kathryn L. Osterhaug

4.92 NATURE OF THE TOXIC SUBSTANCES IN OVERHEATED OILS

Anonymous
Nutrition Reviews 15, 346-348 (November 1957)

Investigations of the toxicity of oils to date have revealed neither the exact nature of the toxic principle involved nor the site and mechanism of its action. The reasons for the lack of this information probably are the many different methods of treating oil, the different types of oil used, and the multiple nature of the toxic substances. Two studies that recently appeared have delineated the structural requirements for the production of toxicity during the heat treatment of oils.

Study A. -- The effect of 20-percent corn oil, margarine, or butterfat that had been heated in air in a manner similar to that used in commercial deep-fat frying (200° C. for 24 hours in equilibrium with air) in the diets of rats was studied by O. C. Johnson, T. Sakuragi, and F. A. Kummerow (J. Am. Oil. Chem. Soc. 33, 433 (1956)). Small decreases in iodine value and increases in acid and peroxide value were observed in all three of these fats as a result of heating. Peroxide values increased only 15 to 18 milliequivalents per kilo, possibly because of destruction and further reaction of the peroxides first formed.

Diets were fed both ad libitum (corn oil and butter) and on a pair-feeding basis (all three fats). Weanling rats were kept on their respective diets for 9 weeks in experiment 1 and for 26 days in experiment 2. In both experiments, rats fed the oxidized corn oil had markedly lower rates of growth and symptoms such as diarrhea, rough fur, and decreased food intake when compared with control rats fed fresh oil. Rats fed heated margarine had moderately reduced growth rates as compared with control rats, whereas rats fed heated butter showed no difference in rate of growth in comparison with control rats.

These results indicate that the toxic effect of the heated oils varied with their poly-unsaturated fatty acid content. The peroxide values of the heated oil all were about equal. The most likely

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COMMERCIAL FISHERIES ABSTRACTS VOL. XI, NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE.

ABSTRACTER: Martin Heerdt

6.15 EVAPORATING STICKWATER IN HERRING OIL INDUSTRY

Anonymous
Norwegian Fishing News 4, 9-11 (1957)

The stickwater in a Norwegian herring oil factory contains an average of: 5.1 percent dissolved matter, 2.0 percent sludge, 0.5 percent fat, and 92.4 percent water.

A typical analysis of vitamins may be: 1.90 $\mu g/g$ Riboflavine, 11.7 $\mu g/g$ Pantothenic acid, 0.07 $\mu g/g$ vitamin B_{12}, and 32.0 $\mu g/g$ Niacin. These constituents have turned the stickwater previously rejected into a valuable source of feed meal.

The first attempts to utilize the stickwater were made using ordinary production machines. To lower fuel consumption, multiple evaporation of the stickwater was introduced.

The special problems in the operation of evaporators in the herring oil industry are the prevention of scale on the heating surface and the loss of vitamins during evaportaion. Loss of heat-sensitive vitamins cannot be avoided, as the press liquid has to be heated to from 95° to 98° C. to obtain a good separation of oil and water. Laboratory investigations have proved that these losses depend on a temperature-time factor. The solution may be kept at a relatively high temperature for a short period with less loss of vitamins than if it is kept at lower temperature for a longer period. Stickwater should be evaporated at low temperatures in the shortest possible time.

The described stickwater-evaporating plant has a circulating pump that forces the liquid over the heating surface, thus increasing heat transfer and reducing scale formation. Triple-effect and quadruple-effect evaporators, each with a capacity of 20,000 kilograms of evaporated water per hour at temperatures not exceeding 110° C., have been manufactured.

The heating surfaces are pipes that easily can be cleaned and inspected through the cover on top of the heater. The vapor tank is placed on the side of the heater. It is connected in such a way that liquid and vapor flow tangentially from the heater into the tank. Water drops in the vapor are thrown out to the walls of the tank by centrifugal force, and the vapor leaving the tank is clean. The liquid

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COMMERCIAL FISHERIES ABSTRACTS VOL. XI NO. 3 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Kathryn L. Osterhaug

MARKETING FROZEN FISH

FISH AND ATHEROSCLEROSIS

TOXICITY OF HEATED OILS

EVAPORATING STICKWATER

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servings. This diet, used for 175 patients that were treated for periods varying from 5 to 8 years, has been about 60 percent successful in lowering levels of cholesterol in the blood, and this group has a death rate only one-third as high as expected.

Why seafoods are important in the diet.--The accompanying table shows the fat contents of some of the common Pacific seafoods. Most of these are low in fat, with the exception of king salmon and Columbia River smelt. (The cholesterol lowering or raising effects of the fat in these fish are unknown at this time.) To these fish low in fat, however, we can add unsaturated fat and still have a total fat content equivalent to beef, the commonly used meat in our work. This added unsaturated fat may be used to aid cooking, in flavorsome seafood dressings, or in salad dressings. The result is a protein product of many varieties, excellent in nutritional value, and favorably accepted by patients.

By serving seafood a minimum of three times a week at spaced intervals, it is possible, by use of the procedure described above, to have a diet low in fat and yet relatively high in unsaturated fat. This diet approximates that of countries having a low death rate from atherosclerosis. Theoretically, from all knowledge now known regarding atherosclerosis, a diet of this type is desired.

Fat Content of Common Northwest Seafoods (in grams per 8 ounces)	Grams
Scallops	.3
Sole	.5
Cod	.8
Tuna in water	1.2
Yellow Perch	1.6
Clams	3.2
Shrimp	3.2
Ocean Smelt	4.4
Oysters	4.7
Crab	6.1
Halibut	10
Herring	11
Salmon	
Chum	11.8
Pink	14.1
Silver	19.1
Sockeye	21.8
King	30

3.26

5. Take advantage of any special packer's or industrywide promotions during Lent, Fish Week or other periods. Such campaigns, conducted on a mammoth scale, always result in an increased sale of frozen seafoods. Get your share of this plus business by heavily featuring seafoods in advertising and store "specials" during such promotions. It's sound business practice.

6. Keep constant check on space allocation for frozen seafoods as related to turnover and profit. As good promotion increases seafood sales, make certain that such products receive the size of display they need to continue to mount in volume.

7. The quality of the frozen seafoods you sell are as much your concern as the customers'. Make it a point to find out from customers and trade sources the quality of the lines of frozen seafoods you are handling. Many stores get greater turnover with quality, higher-priced lines which encourage repeat sales. There are only two kinds of fish--good and bad.

8. Give serious consideration to the packaging effectiveness of the seafood products you handle. Since a large percentage of frozen seafood sales are on impulse, packaging is of utmost importance in helping to sell the fish as well as protecting it.

9. Use the point-of-sale material supplied by packers. Such material is a constant reminder to consumers and invariably results in additional sales. Change the point-of-sale material frequently to give shoppers the impression that there is always either a new product or a new "special" for them to consider. This adds a little excitement to the regular food-shopping chore.

10. Suggest in point-of-sale, advertisements, banded promotions and by word-of-mouth items associated with seafoods, such as sauces, french fried, potato chips and other products to increase sales and profits.

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flows from the vapor tank to a circulating pump that forces the liquid through the heating pipes.

Steam and vapor.--Steam is supplied to the first effect and

vapor from I effect is supplied as heat medium for II
vapor from II effect is supplied as heat medium for III
vapor from III effect is supplied as heat medium for IV
vapor from IV effect is led to a barometeric condensator.

The most common feed arrangement is called forward feeding. This signifies introducing the dilute liquid in the first effect, feeding from effect to effect by the difference in pressure between effects, and withdrawing concentrated liquor from the last effect. Backward feed signifies introducing the dilute liquid in the last effect, advancing it from effect to effect by pumps, and withdrawing concentrated liquor from the first effect. Parallel feed signifies the introduction of dilute liquid into every effect, and mixed feed covers all other arrangements. The advantages of forward feed are: simplest arrangement of equipment, simplest control, and use of only one pump, the suction of which is under vacuum.

The principal disadvantage of forward feed is that if the feed is cold it puts an undue load on the first effect and increases the steam consumption for a given amount of evaporation.

Mixed feed is especially useful when stickwater is to be concentrated through a wide range of densities and when the liquor is very viscous. In these cases, a routing of liquor often is used. This procedure has the advantage of forward feed, requires only one pump to return the liquid from the last to the first effect, and evaporates the liquor of the highest viscosity in the body with the highest boiling point. This arrangement also is dictated by the special circumstances that both the press-water and the concentrated liquor shall be delivered to the factory's separator department at temperatures of 95° to 98° C.

The parallel feed arrangement makes it possible to feed the evaporators in a variety of ways. Which method will be most profitable depends on the special circumstances.

Operation.--In general, continuous operation is preferred wherever it is possible. If the finished material is very viscous, as in making condensed fish solubles, batch operation may be desirable.

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reason for the toxic effect appears to be an irritation of the intestinal tract by some of the substances in the heated oil. Permanent metabolic damage was not produced.

Study B.--The possible nature of these toxic substances, when produced under markedly different conditions, was studied by E. W. Crampton, R. H. Common, E. T. Pritchard, and F. A. Farmer (J. Nutrition 60, 13 (1956)). These workers reported on studies with polymerized linseed, soybean, and sun-flower seed oil that had been heated at 275° C. under carbon dioxide for from 12 to 26 hours. Ethyl esters prepared from the three heated oils were separated by distillation and urea fractionation into distillable (largely monomeric) and non-distillable (largely polymeric) adduct-forming (largely straight chain) and non-adduct-forming (largely "cyclic monomer") fractions. All fractions were fed to rats at 10- and 20-percent levels for 28 days. Low weight gains and even deaths occurred in rats fed the cyclic monomer and polymeric fractions derived from linseed oil and, in some instances, from soybean oil. The most toxic fractions were the cyclic monomers, especially those obtained from linseed oil. Polymeric fractions were poorly digested; however, they appeared to be efficiently utilized if absorbed. These materials caused diarrhea and sticky feces which, in some instances, brought the diet study to an end because of the state of the rats.

Alkali isomerization of the non-adduct forming fractions from the three oils revealed marked differences. Both sunflower- and soybean-derived oil products contained large amounts of readily (25 minutes) and difficultly (6 hours) conjugatable diene as shown by increases in absorption at 233 millimicrons. The linseed fractions contained very little conjugatable diene; however, they did possess higher iodine numbers and refractive indices.

The production of highly toxic substances from heated oils depends on the presence of large proportions of fatty acids that have three or more double bonds. No information was obtained as to the action of the toxic substances. Inasmuch as heating was carried out anaerobically, peroxides were not produced, and did not contribute to the toxic effect.

4.93 ADVANCING THERAPY

Anonymous
Drug and Cosmetic Industry 81, 223 (August 1957)

Essential Fatty Acids and Coronary Disease

Ancel Keys, in a study reported in Geriatrics for May 1957, concludes that there are very great differences between populations in the incidence of atherosclerosis and the mortality of coronary heart disease at given ages. These differences are not explained by race, nationality, or climate or any nondietary factor so far studied.

The differences in the frequency of coronary heart disease appear to be closely correlated with the average serum cholesterol concentration in samples of the populations.

Both the serum cholesterol concentration and the frequency of ischemic heart disease are unrelated to the amount of protein in the diet, but there is a close correlation with the proportion of fats in the habitual diet.

In those population groups that have been studied, where the proportion of fats in the diet has changed, increased, or decreased, there has been a subsequent change in the frequency of ischemic heart disease, the time lag being of the order of a year or two.

The influence of dietary fat on the frequency of coronary heart disease probably operates through effects on both atherosclerosis and thrombosis. Different dietary fats differ in their effect on serum cholesterol and probably on atherosclerosis, for the common meat and dairy fats that predominate

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6.190 THE NUTRITIVE VALUE OF FISH MEAL AND CONDENSED FISH SOLUBLES XI. THE PROTEIN NUTRITIVE VALUE OF FISH MEALS OF LOW AND NORMAL FAT CONTENT

March, B. E.; Biely, Jacob; and Tarr, H. L. A. (University of British Columbia, Vancouver, B. C., Canada)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 108, 24-26 (September 1957)

This study is concerned with (a) commercial British Columbia herring meal sample 1; (b) commercial British Columbia herring meal sample 2; (c) a laboratory-prepared meal designated as an ideal meal; (d) an ideal meal from which the fat had been extracted; (e) a commercially defatted fish meal supplied by the VioBin Corporation, Monticello, Illinois; and (f) a reference standard menhaden meal.

Experimental.--In experiments 1 and 2, each of the above six different fish meals was used at a level of 16.5 percent as a major source of protein in six different chick diets composed essentially of purified ingredients and formulated to be adequate in vitamins and minerals. Condensed herring solubles and dehydrated cereal grass were added to each of the diets as sources of unidentified growth factors. The total protein level of each of the diets with the protein contributed by the condensed herring solubles and dehydrated cereal grass was 18 percent. The remainder of each of the diets consisted of cerelose (commercial glucose).

Each of the six diets was fed to three lots of 14 New Hampshire female chicks over a period of 14 days in experiment 1, and to two lots of 20 New Hampshire male chicks over a period of 21 days in experiment 2. The final average weights of these chicks were recorded. In experiments 3 and 4, each

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ABSTRACTER: Martin Heerdt

FATTY ACIDS IN HEART DISEASE

PROTEIN VALUE OF MEALS

6.51 THE NUTRITION OF TROUT V. INGREDIENTS FOR TROUT DIETS

Phillips, Arthur M., Jr. and Balzer, George C., Jr. (Bureau of Sport Fisheries and Wildlife, Fish and Wildlife Service, Cortland, New York and Boston, Massachusetts)
The Progressive Fish-Culturist 19, 158-167 (October 1957)

Food supplies the energy and raw materials necessary to carry on the processes of life from the time of conception until death. Only the material that is absorbed into the body through the digestive tract or gills may be considered food, for only after absorption is the material available to the body. The sole requirement of an animal's diet is that it must contain all of the ingredients required to satisfy all of the metabolic needs of the body.

Food ingredients for trout feeding may be grouped into the following classes: (1) fresh meats, (2) fresh fish, (3) plant concentrates, (4) animal concentrates, and (5) dietary supplements.

1. Fresh meats provide unknown elements that are essential for the prevention of anemia in trout, and many of these products also are excellent sources of vitamins.

2. Fresh fish have been used widely in trout diets, but must be fed with caution. Fresh fish may cause a thiamine deficiency when fed to trout, resulting in high mortalities. Among the fish species that are known to cause a thiamine deficiency are whitefish, bullheads, carp, goldfish, suckers, buckeye shiners, salt-water herring, and creek chubs. Cooking the fish before feeding them to the trout eliminates this trouble but adds to the labor cost of food preparation. The inclusion of fish that will not cause a thiamine deficiency in the diet of trout usually results in a high rate of conversion of food into fish flesh. The low cost of the fish product is not an advantage, as the cost of production in terms of fish flesh produced is usually higher than the cost of production when

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ABSTRACTER: Kathryn L. Osterhaug

INGREDIENTS FOR TROUT DIETS

7.45 A COLORIMETRIC PROCEDURE FOR PHOSPHORUS IN FEEDS AND MARINE PRODUCTS

Gersten, Bertram (Massachusetts Agricultural Experiment Station, Amherst)
Journal of the Association of Official Agricultural Chemists 40, 1056-1059 (November 15, 1957)

Determination of phosphorus in feeds according to the method of the Association of Official Agricultural Chemists (A. O. A. C.) is time-consuming for a control laboratory. A more rapid procedure that is reasonably accurate would be more desirable.

Several photometric methods for the determination of phosphorus in feeds and marine products were examined. A method that uses 1, 2, 4-aminonaphtholsulfonic acid (ANSA) as a reducing agent for molybdenum blue was selected for its convenience and accuracy. This method was used to determine phosphorus in several feeds and in marine products. At present, an official A. O. A. C. method for determining phosphorus in marine products has not been established.

Most investigators wet ash the samples with nitric and sulfuric acids. This procedure was suitable for the digestion of the samples at hand. In a study of soil phosphorus by colorimetric determination, Sherman (1942) established optimum levels of acidity, time, and temperature for the determination. To obtain the correct acidity, he added 25 milliliters of perchloric acid to an aliquot of the digest in a 25 ml. volumetric flask. The color developed and read at a room temperature of 25° ± 4° C. gave optimum and consistent readings.

Reagents used.--Reagents used were: perchloric acid, 60 percent; ammonium molybdate solution, 5 grams dissolved in 100 ml. of water; recrystallized 1, 2, 4-aminonaphtholsulfonic acid (ANSA), 0.125 grams dissolved in 44 ml. of 15 percent $NaHSO_3$ to which was added dropwise a 20 percent

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ABSTRACTER: Martin Heerdt

ASSAY FOR PHOSPHORUS

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of the fish meals, respectively, was fed over a period of 21 days as a protein supplement in a practical chick starting diet formulated to be complete in vitamins and minerals. As in experiments 1 and 2, condensed herring solubles and dehydrated cereal grass were added as sources of unidentified growth factors. These diets contained equal quantities of wheat and corn, both of which were increased or decreased depending upon the protein level of the fish meal included in the diet. The protein level was maintained at 21 percent in experiment 3 and at 19 percent in experiment 4. In experiment 3, each diet was fed to three lots of 21 male New Hampshire chicks, whereas in experiment 4, each diet was fed to three lots of 17 New Hampshire chicks. Average final weights were recorded, and efficiency of feed utilization was calculated.

Results.--No difference was obtained in the response of chicks to either defatted commercial or defatted laboratory-prepared meals in experiments 1 and 2. Chicks that received ideal meals in experiment 1 showed poorer growth than chicks that received the commercial meal in experiment 1, but this finding did not hold for experiment 2. Chicks that received herring meal in practical diets in experiments 3 and 4 showed little or no difference in their rate of growth; however, chicks that received the reference menhaden meal were lighter in final weight in both experiments 3 and 4 than chicks that received herring meal.

The ratio of weight of food consumed to weight gained in experiments 3 and 4 showed that the lowest efficiency of feed utilization occurred with reference standard menhaden meal as a protein supplement. The rate of growth on commercial or ideal meals was not affected by the fat content of these meals; however, feed efficiency was better with diets that contained meals of low fat content. This finding was substantiated by the work of Biely and March (1954), who found that the addition of fat to chick diets containing a suboptimal level of protein may depres growth and feed efficiency. In experiments 3 and 4 the fat content of the menhaden meals depressed the efficiency of feed utilization only. The protein nutritive value of British Columbia herring meal was found to be no different from the value of commercially defatted fish meal.

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solution of Na_2SO_3 until the solution cleared; reagent grade dihydrogen phosphate used as a primary standard, 0.4394 grams dissolved in water and diluted to one liter; and a secondary standard that consisted of 10 ml. of the primary standard diluted to 200 ml. with water.

Standard curve.--Pipet 2, 4, 6, 8, and 10 ml. portions of secondary standard into 25 ml. volumetric flasks. Add 2.5 ml. $HClO_4$ and 8 ml. of the ANSA solution to each flask. At intervals of 30 seconds, add 2 ml. $(NH_4)_2MoO_4$ diluted to volume with water and mix. Allow the color to develop for 15 minutes after the samples are adjusted to 25° C., and read the absorbance in a spectrophotometer at 730 mμ against a blank containing all of the reagents used in the development of color.

Determination.--Digest a 2 g. sample with 30 ml. HNO_3 and 10 ml. H_2SO_4. Add a few drops of HNO_3 near the end of the digestion until the solution becomes colorless. Cool, dilute to 200 ml., mix, and allow to settle. For up to 1 percent phosphorus (most feeds and marine products) the final aliquot for color development should represent 5.0 ml. of sample.

Discussion.--The colorimetric method was used for the determination of phosphorus in a variety of materials including fish meal, dried terrapin meat, dried whole clams, quahog meat, poultry breeder mash, poultry laying mash, broiler concentrate, dairy feed, poultry starter mash, and phosphate rock. The results obtained showed good agreement between the ANSA method and the A.O.A.C. method for feeds. Wet ashing with nitric acid and sulfuric acid was applicable to all of the materials tested. This method covers a phosphorus range of up to 60 μg. of phosphorus in the final 25 ml. of solution. Measurements were made with a Model 11 Coleman Universal spectrophotometer. The ANSA method eliminated a number of time-consuming operations required by the A.O.A.C. method. As many as 12 samples can be handled conveniently at considerable saving in time.

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the American diet have a powerful tendency to raise the serum cholesterol level. Unsaturated and linoleic acid fats tend to reduce the serum cholesterol level. But fish oil is not particularly effective and the action of the most effective of these fats, corn oil, is not fully explained in terms of fatty acid composition.

"The addition of corn oil or any other oil to the American diet, without reducing the ordinary fats in that diet, can have very little effect on the serum cholesterol level unless very large amounts are used, and this would mean an impossibly high caloric intake.

"There is no reason to believe that the addition of corn oil, sunflower seed oil, safflower seed oil, or fish oils to our diets, without other diet changes, could prevent or control coronary heart disease.

"Lastly, it should be realized that we are far from knowing all the answers. We need a great deal more research. But I doubt that the day will come soon when we can load our blood with fat without affecting cholesterol and blood coagulability. I see no prospect of preventing coronary heart disease merely by taking pills or capsules or periodic swallows of corn oil."

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the other available hatchery diets are used. The best practice is to eliminate fresh fish from the diet of hatchery trout.

3. Plant concentrates are the least expensive of the ingredients commonly used in trout diets. These products are mainly a source of carbohydrate, although many of them contain a fairly high percentage of protein.

4. Animal concentrates are excellent sources of protein for trout growth. All of these products are dehydrated artificially, and the method of manufacture determines their value in hatchery diets. In general, products that are dried in vacuum, under low heat, are superior to those dried in air, under high heat. The majority of the animal concentrates are poor sources of vitamins.

5. Dietary supplements are materials that provide specific essentials or perform a specific function in animal nutrition. In fish hatcheries there is a tendency to utilize many of the commercially available supplements that have been developed for the diets of higher animals. There is little experimental justification for the inclusion of these products in trout-hatchery diets. Only three supplements--salt, dried brewer's yeast, and cod-liver oil--have produced results that justify the additional expense.

The usual measures of efficiency of a hatchery diet are (1) growth of the fish, (2) conversion of the food into fish flesh, (3) mortality of the fish, and (4) cost to produce 1 pound of fish flesh.

7.52 A MODIFIED PROCEDURE FOR THE ESTIMATION OF AVAILABLE LYSINE IN FOOD PROTEINS

Bruno, Dorothy and Carpenter, K. J. (School of Agriculture, Cambridge, England)
The Biochemical Journal 67, 13p (November 1957)

Many animal products react with fluoro-2:4-dinitrobenzene (FDNB). If this reaction is followed by acid hydrolysis and the product is washed with ether, solutions are obtained in which only ε-DNP-lysine appears to give significant color (Carpenter and Ellinger, 1955). This measure of lysine is closely related to the gross protein value of animal products for chick feeding where conditions make lysine the limiting factor (Carpenter, Ellinger, Munro, and Rolfe, 1957).

Vegetable materials contain substances that interfere with color development when they are assayed for lysine by this procedure. A modified procedure for lysine is based on the reaction of methoxycarbonyl chloride (MC-Cl) with A-amino-groups (Chibnall and Spahr, 1957). If ε-DNP-lysine is present, an ether-soluble DNP-NH·$(CH_2)_4$·CH(COOH)·NH·CO·OCH_3 is obtained (Bailey, 1957).

Procedure. -- Shake the ground food-protein material with FDNB. Hydrolyze with 24 milliliters (ml.) of 8.1 normal HCl. Reflux 16 hours and make the filtrate to 100 ml. with water. Transfer an 0.3 to 1.0 ml. aliquot to a glass stopper tube, extract twice with 5 ml. of di-ethyl ether, and remove the dissolved ether by warming. Titrate a blank aliquot containing phenolphthalein, and on the basis of this titration make the residue alkaline with 2 normal NaOH. Shake with 2 ml. of buffer (8 percent weight to volume of $NaHCO_3$ and Na_2CO_3 combined to give a pH of 8.5). Add 0.05 ml. MC-Cl and shake. After 10 minutes add 0.75 ml. of concentrated HCl. Shake two 5 ml. portions of di-ethyl ether with the contents of the tube, recover the ether, and evaporate it to dryness. Redissolve the residue in 10 ml. of 1 normal HCl with warming and read the solution in an absorptiometer

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

7.599 PARALYTIC SHELLFISH POISON. VI. A PROCEDURE FOR THE ISOLATION AND PURIFICATION OF THE POISON FROM TOXIC CLAM AND MUSSEL TISSUES

Schantz, Edward J.; Mold, James D.; Stanger, D. Warren; Shavel, John; Riel, Frank J.; Bowden, John P.; Lynch, Joseph M.; Wyler, Ruth Savage; Riegel, Byron; and Sommer, Hermann (Northwestern University, Chicago, Illinois)
Journal of the American Chemical Society 79, 5230-5235 (October 5, 1957)

An improved procedure described in this paper resulted in the purification of mussel poison to a toxicity of 5500 ± 500 mouse units (MU) per milligram (mg.) with better yields and greater ease of operation. It also accomplished equally well the purification of the poison from toxic Alaska butter clams (Saxidomas giganteus). Although the poison content of clams is usually much lower than that of mussels, toxic clams were important as a source of the poison because the supply was larger and generally more available than from mussels. About two-thirds of the poison found in a clam is contained in the siphon, which was used as the starting material in this work. Clams were collected only when the toxicity of the siphons was 5,000 to 10,000 or more MU per 100 gram. Mussels on the other hand contain 90 to 95 percent of their poison in the liver or digestive gland, and these were used when the toxicity was 0.5 or more MU per gm. Acidified aqueous extracts from toxic clams usually contained material with a toxicity of about 0.5 to 2 MU per mg. of solids, whereas extracts from mussels usually contained 2 to 8 MU per mg. of solids.

The collection and preparation of the toxic digestive glands of mussels have been described previously. Toxic butter clams were collected in Southeastern Alaska. The siphons of the clams were removed, canned, and frozen until they could be ground with acidified aqueous ethanol. The digestive glands of mussels were removed and ground with acid aqueous ethanol.

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UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt

7.599 PARALYTIC SHELLFISH POISON. VII. EVIDENCE FOR THE PURITY OF THE POISON ISOLATED FROM TOXIC CLAMS AND MUSSELS.

Mold, James D.; Bowden, John P.; Stanger, D. Warren; Maurer, John E.; Lynch, Joseph M.; Wyler, Ruth S.; Schantz, Edward J.; and Riegel, Byron
Journal of the American Chemical Society 79, 5235-5238 (October 5, 1957)

This report discusses the evidence that indicates the poisons with a toxicity of 5500 ± 500 MU per milligram (mg.) and $[\alpha]\ ^{25}D + 130 \pm 5°$ are in a highly purified state.

By working at low temperature (5° to 10° C.) and by buffering the solutions at pH 8, a suitable solvent system was developed for the countercurrent distribution of the shellfish poisons. This system consisted of a mixture of η-butyl alcohol, 95 percent ethanol, 0.1 M aqueous potassium bicarbonate and α-ethylcaproic acid in a volume ration of 146:48:200:5 with the aqueous layer adjusted to pH 8. The distribution of some model substances in this system was determined to test the selectivity of the fractionation.

The most important evidence for purity was the data obtained from countercurrent distribution of dihydro clam poison. The dihydro poison was prepared by reduction of the poison with hydrogen at one atmosphere of pressure over Adams platinum catalyst. The distribution of the dihydro clam poison with the solvent system described above accurately fits the theoretical distribution curve calculated for a single component. The distribution of nonreduced purified clam poison by the Craig technique also provided evidence for the purity of the compounds, but the data indicated that the poison consisted of a mixture of at least two components.

These two components, designated A and B, are believed to be tautomeric forms of the poison,

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt

9.7 THE NORWEGIAN CANNING INDUSTRY'S SCHOOL

Scattergood, Leslie W. (U. S. Fish and Wildlife Service, Boothbay Harbor, Maine)
The Canning Trade 79, 6-7 (July 8, 1957)

The canning school. -- The Norwegian Canning School is financed by a tax on the production of the canneries. There are also some private donations to finance the initial operations and the construction of the school. The students pay no fees, except for minor purchases of school supplies. Board and room are free.

There are two courses. One is a preliminary training period of four to five months for students that have only had a grammar school education, and the second course is for those who have passed the first course or who have had about the equivalent of our high school education. The second course lasts for about nine months, and it is during this period that the more technical education is provided.

Subjects. --The subjects that are of special value to cannery supervisors include the study of fishery laws and regulations, fishery biology, factory sanitation, bacteriology, chemistry, mathematics, physics, food preservation, machinery design and drawing, and production planning. Basic training is given in all these subjects, with particular emphasis on their applications to cannery work. At the conclusion of the final course, a comprehensive examination is given, and diplomas are awarded to the successful candidates. They are then ready to resume their work in the canning industry with a much greater comprehension of the principles involved in proper food processing.

Facilities. -- The school has all the facilities needed to study the various subjects and has an excellent staff of teachers, trained in both the practical and technical phases of food processing. A

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ASSAY FOR LYSINE

ISOLATION OF CLAM TOXIN

PURITY OF CLAM TOXIN

FISH CANNING SCHOOL

7.599 (Cross Reference: 2.9)

The aqueous alcoholic suspensions of the ground tissues from toxic mussels or from clams were mixed with Celite 545 to a moist, mealy consistency; and the poison was extracted by percolation with 15 percent ethanol acidified to pH 2 to 3 with hydrochloric acid. The recovery of the poison in the extract was 98 to 100 percent.

Removal of most of the acidic and neutral contaminants was accomplished by adsorption of the poison on columns of the sodium form of the carboxylic acid ion exchange resin, Amberlite IRC-50. A large proportion of the sodium ions remaining on the resin were eluted with 1 M acetic acid buffered at pH 4 with a saturated solution of sodium acetate. Subsequent fractional elution with 0.5 M acetic acid yielded up to 90 percent of the poison with a toxicity of 100 to 500 MU per mg. The remaining poison with a lower toxicity was reworked with subsequent batches of poison. The fractions containing material with a toxicity of 100 to 500 MU per mg. were combined and the excess acetic acid removed by vacuum evaporation. Further purification was accomplished by chromatography on the finely divided hydrogen form of the resin, Amberlite XE-64. This chromatogram was developed and the poison eluted with 0.1 M acetic acid. Usually two passes through the column brought the toxicity of 70 to 80 percent of the material to about 2500 or more MU per mg. solids, which appeared to be the practical maximum attainable by the process.

Further purification of the poison was accomplished by chromatography on acid-washed alumina using absolute ethanol as the solvent. The poison was converted to the hydrochloride salt by adding an amount of hydrochloric acid equivalent to the acetate ion present and removing the acetic acid by vacuum distillation. Water was removed from the poison concentrate by co-distillation with absolute ethanol. The ethanolic solution of the poison, after filtration to remove an insoluble precipitate, was applied to the alumina column. Development of the chromatogram and elution of the poison was accomplished with absolute ethanol and aqueous ethanol. Poison with a toxicity of 5500 ± 500 MU per mg. solids, $[\alpha]^{25}D + 130 \pm 5°$, was obtained in the first few fractions in 25 to 45 percent yields. The remaining fractions of lower toxicity were reworked to increase the total recovery through the alumina to 70 to 90 percent.

The recovery of purified poison from the starting material by a single pass through all steps in this procedure ranged from 15 to 30 percent. The recovery was increased to as high as 50 percent by reworking the less pure fractions.

9.7

complete canning line, including various types of both old and modern equipment, is operated in the basement of the school building. Physical, chemical, biological, and bacteriological laboratories are well equipped, as are the machine repair shops. The whole physical set-up plus the enthusiasm of the teachers make a very favorable impression on the visitor.

Research.--The main laboratory of the canning industry is in an older adjoining building, and the students observe and at times take part in the research activities there. In this laboratory, a staff of food technologists, bacteriologists, and chemists are engaged in solving the many problems that food processors face. For example, how to eliminate the blackening of shrimp, or how to lengthen the period during which canned spiced herring tidbits can be kept without deterioration, or how to find the best method of smoking sardines.

The canning industry is well satisfied with the school that they have established and feels that the best chance of insuring a steady improvement in Norwegian canned products is by providing intensive training for their principal cannery personnel, who can apply their increased knowledge at the actual production level. Schools of this type should be given consideration by those interested in improving the efficiency of our canning industries.

7.52

(601 filter at 435 mμ). Compare the extinction equivalent for ε-DNP-lysine aliquots carried through a similar procedure and calculated the lysine equivalent.

Results.--Nine samples of oil-seed, cereal, and grass products and eight samples of leaf protein concentrates processed in different ways gave values ranging from 1.9 to 4.9 g. lysine per 16 g. of nitrogen. These values showed a highly significant correlation (r = 0.84) with their respective gross protein values.

This procedure may prove useful for grading vegetable products; carbohydrate interference, however, can increase the loss of DNP-lysine during hydrolysis. Chromatography with mixed organic solvents on buffered paper revealed an interfering band in some instances. This band on elution has shown little extinction at 435 mμ.

7.599 Cross Reference: 2.9)

because after reduction the molecule apparently was stabilized and exhibited only one component on countercurrent distribution. Mussel poison and dihydro mussel poison exhibited behavior similar to that of clam poison and dihydro clam poison. Only one component was observed on countercurrent distribution of the dihydro mussel poison and two components, A (K = 2.7) and B (K = 1.2) on distribution of the nonreduced poison. When the contents of tubes containing the component A in largest amount were combined, concentrated, and redistributed with this solvent system, a distribution pattern was obtained that was comparable to that obtained originally. Similarly, when the contents of tubes containing the component B present in lesser amount were combined, concentrated, and redistributed with this solvent system, the reappearance of the original pattern made it apparent that an equilibrium of the components A and B had been partially re-established.

The distribution of the poison on the basis of mouse units (MU) followed the distribution of nitrogen for combined components A and B, when a period of equilibration was allowed. The reduced poison was not toxic and of course could not be followed by bioassay. The bioassay, when carried out immediately after the distribution, was complicated to some extent by the fact that the assays in tubes containing mainly component A were considerably higher in the number of MU than the nitrogen content would indicate and tubes containing mainly component B were somewhat lower. The conversion from the nitrogen analysis to MU was based on 26.3 percent nitrogen in the poison and a toxicity of 5500 MU per mg. of poison. However, when the solutions of each tube were acidified and allowed to stand 16 to 24 hours, both components showed the number of MU to be in agreement with the nitrogen content.

Since the average error of the nitrogen content, as determined by micro-Kjeldahl analysis, was about 5 percent, the Craig countercurrent distribution procedure indicates that the purity of clam and mussel poisons with a toxicity of 5500 ± 500 MU per mg., should be within 95 to 100 percent.

Both clam and mussel poison hydrochlorides, purified (a) by ion exchange chromatography on Amberlites IRC-50 and XE-64 followed by chromatography on alumina, (b) by chromatography on Norit A and crystallization as the helianthate and (c) by countercurrent distribution procedures, resulted in a product with a toxicity of approximately 5000 MU per mg.

0.5 A STUDY WHETHER THE BACTERIA HAVING AN ACTIVITY WHICH CAN PRODUCE A LARGE AMOUNT OF HISTAMINE, SO-CALLED HISTAMINE-FORMER, ARE PRESENT OR NOT, ON THE SURFACE OF FRESH FISH

Kimata, M. and Tanaka, M.
Mem. Res. Inst. Food Sci., Kyoto Univ., No. 8, pp. 7-16 (1954)
Food Science Abstracts 29, 128 (April 1957)

0.5 (Cross Reference: 2.01)

NUTRITION AND METABOLISM OF MARINE BACTERIA. V. THE INHIBITION OF GROWTH OF A MARINE BACTERIUM BY AMINO ACIDS AND THE DEVELOPMENT OF RESISTANT STRAINS

Tomlinson, N. and MacLeod, Robert A. (Fisheries Research Board of Canada, Technological Station, Vancouver, British Columbia, Canada)
Archives of Biochemistry and Biophysics 70, 477-490 (August 1957)

The oxidation by and utilization of 21 amino acids as the sole carbon or nitrogen source for the growth of a specific marine bacterium with simple nutritional requirements has been investigated. Sixteen served as a nitrogen source, 13 were readily oxidized, but only 5 served as a sole carbon source. Because they inhibited growth, except in the presence of another suitable source of carbon, certain readily oxidized amino acids failed to serve as a source of either carbon or nitrogen.

1.51 NUCLEOTIDES IN THE SKELETAL MUSCLE OF CODLING (GADUS CALLARIUS)

Jones, N. R. and Murray, J.
The Biochemical Journal 66, 5p (May 1957)

(Abstract of this article appears under 8.59 page 15 - October 1957)

1.51 CHEMICAL CHANGES OCCURRING IN COD MUSCLE DURING CHILL STORAGE AND THEIR POSSIBLE USE AS OBJECTIVE INDICES OF QUALITY

Shewan, J. M. and Jones, N. R.
Journal of the Science of Food and Agriculture 8, 491-498 (August 1957)

(Abstract of this article appears under 8.8 page 19 - January 1958)

1.84 SLED-TYPE SCALLOP DREDGE TRIPLES HAULS

Anonymous
National Fisherman 37, 16-17 (August 1956)

(Abstract of this article appears under 2.1128 page 3 - February 1957)

1.84 SCALLOPS AND SCALLOP DREDGES

Mason, James and Baird, R. H.
World Fishing 6, 35-37, 39 (April 1957)

(Abstract of this article appears under 2.1178 page 3 - September 1957)

1.85 SHRIMPS AND SHRIMP METHODS IN THE U. K.

Noel, H. S.
World Fishing 6, 51-55 (June 1957)

(Abstract of this article appears under 2.1471 page 7 - December 1957)

2.03 BIOCHEMICAL STUDIES ON SKIPJACK, KATSUWONUS VAGANS

Kashiwada, Ken--ichi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 10, 1062-1069 (1956) (English summary and tables)

VIII. On the mechanism of ammonia formation in pyloric caeca (1).
IX. On the mechanism of ammonia formation in pyloric caeca (2).

2.03 CONTRIBUTION TO THE ENZYMOLOGY OF THE SURMULLET (MULLUS BARBATUS

Castella, E. and Varela, G.
An. Bromatol 7, 141-148 (1955)
Food Science Abstracts 29, 430 (October 1957)

Tests were made for enzymes in the stomach, pylorus, intestine, gills, heart, kidney, eyes, dorsal and ventral muscles, bone, and skin of good quality surmullet. The activity of the following enzymes was determined: (1) acid phosphomonoesterase (pH 5), (2) alkaline phosphomonoesterase (pH 9), (3) rhodanese, and (4) carbonic anhydrase. Liver, heart, and kidney of the fish were rich in acidic phosphomonoesterase. Rhodanese activity was low. Carbonic anhydrase activity was similar to that reported for other species of fish. Enzymic activity is greatest in the internal organs and in the head.

2.111 DIFFERENCE ON THE FREQUENCY OF TRANSFER OF FISHES WITH DIFFERENT DEGREES OF INCLINATIONS OF UNDERWATER FENCING NET

Hiyama, Yoshio; Kusaka, Takaya; and Kondo, Keikichi
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 10, 602-604 (1957) (English abstract, figures, and tables)

The experiment on inclinations of a fish net, was done in a water tank to observe the frequency of transfer of fishes over several models of fencing net. The 90° net had more stopping effect than any of the others.

2.1124 RHODE ISLAND TRAP FISHING

Gordon, Bernard
Maine Coast Fisherman 11, 21-23 (October 1956)

2.1124 OUTWITTING THE MARINE BORER

Anonymous
Chemical and Engineering News 35, 90 (July 8, 1957)

(Abstract of this article appears under 2.113 page 3 - December 1957)

2.1127 BIOLOGY OF THE BLOODWORM, GLYCERA DIBRANCHIATA EHLERS, AND ITS RELATION TO THE BLOODWORM FISHERY OF THE MARITIME PROVINCES

Klawe, W. L. and Dickie, L. M. (Fishery Biological Station, St. Andrews, New Brunswick, Canada)
Bulletin No. 115 of the Fisheries Research Board of Canada, 37 pp. (1957) (Ottawa)

The bloodworm is the most important of the marine polychaetous worms used as bait in sport fishing. The demand for these worms has created a small but active bait-worm industry, which for the last 20 years has centered in the State of Maine.

2.1127 STUDIES ON TILAPIA AS SKIPJACK BAIT

King, Joseph E. (Pacific Oceanic Fishery Investigations, Honolulu, T. H.) and Wilson, Peter T. (Hawaiian Tuna Packers, Ltd.)
Special Scientific Report: Fisheries No. 225, pp. 1-8 (July 1957) U. S. Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

The cichlid fish, Tilapia mossambica, introduced to Hawaii in 1951 by the Territorial Division of Fish and Game, now has a wide distribution in the islands. During the summer of 1956, tilapia were seined from fresh-water ponds and irrigation reservoirs, acclimatized to sea water, and tested at sea as skipjack bait. The results indicated that tilapia, while inferior in some respects to the native bait (nehu), possessed many desirable qualities. It was concluded that if small tilapia could be produced in large volume at a reasonable price they might alleviate the great need in the Hawaiian skipjack fishery for additional bait supplies.

3.23 FREEZING OF CRUSTACEANS

Hansen, E. W.
Kulde 9, 18-20 (1955)
Food Science Abstracts 29, 30 (February 1957)

Work on the effects of cooking, storage temperature, and packaging, in the commercial freezing of crustaceans, is described. Experiments in which cooked and shelled prawns were frozen in blocks, glazed, and packaged in heat-sealed cartons over wrapped with cellophane, gave results comparable to those obtained with Cry-O-Vac bags, which have disadvantages owing to their shape.

3.23 NECESSARY EQUIPMENT FOR THE FREEZING OF FISH

MacCallum, W. A.
Proc. 9th Int. Congr. Refrig., Paris, pp. 4 096-4 104 (1955)
Food Science Abstracts 29, 422 (October 1957)

The development of techniques for chilling fish other than storage in ice, and for freezing fish, is discussed, with reference to chilling in refrigerated sea water, freezing at sea and on land, packaging, the freezing of fish sticks, the use of ammonia-water absorption machines, and the design of freezing equipment.

4.6 A SYSTEM OF SYNERGISTIC ANTIOXIDANTS IN HERRINGS

Jannesson, E. and Marcuse, R.
Olii Minerali-Grassi E Saponi-Colori E Vernici 34, 10-14 (1957)
Journal of the American Oil Chemists' Society 34, 417 (August 1957)

The aqueous phase of the herring has an antioxidant effect on the herring oil, and certain amino acids are responsible for this action. These amino acids have been separated and identified by paper chromatography. Further, it is shown that a synergism exists between tocopherols as primary antioxidants and amino acids as synergistic substances.

4.60 THE ANTIOXIDANT ACTION OF SOME POLYPHENOLIC CONSTITUENTS OF TEA

Lea, C. H. and Swobada, P. A. T. (University of Cambridge, Department of Scientific and Industrial Research, Cambridge, England)
Chemistry and Industry 31, 1073-1074 (August 3, 1957)

The antioxidant activity of (+) catechin, (-) epicatechin gallate, and (-) epigallocatechin gallata, has been measured. These substances are important constituents both of green and of black tea. Tea polyphenols showed antioxidant activity on a weight basis of the same order as that of propyl gallate when applied to the methyl esters of the fatty acids of lard.

6.72 THE CLEARING ACTION OF SALMINE ON SERUM IN VITRO

Laudat, Ph.; de Gennes, J. L.; and Truffert, J. (Hopital Broussais, Paris)
Arch. intern. pharmacodynamie 108, 192-9 (1956)
Chemical Abstracts 51, 10837 (July 25, 1957)

Partial hydrolysis of protamine sulfate (salmine), followed by partition chromatography, yielded a polypeptide contg. isoleucine, valine, alanine, serine, and glycine, which was more active than the original protein in clearing serum in vitro.

6.72 PHYSICAL AND CHEMICAL PROPERTIES OF PROTAMINE FROM THE SPERM OF SALMON (ONCORHYNCHUS TSCHAWYTSCHA)

Callanan, M. Joan, Carroll, William R., and Mitchell, Ellis R. (National Institutes of Health, Bethesda, Maryland)
The Journal of Biological Chemistry 229, 279-287 (November 1957)

I. Preparation and characterization.--Protamine (salmine) from the ripe sperm of a single species of Pacific salmon (Oncorhynchus tschawytscha) was prepared in high yield by the direct extraction of washed milt with 1.5 M NaCl in 50 percent ethanol. The purity of the preparation was established by sedimentation, electrophoresis, and ultraviolet absorption studies. The sulfate salt contained 24.8 percent nitrogen. The "free" unhydrated base contained 18.7 ± 0.5 arginine groups per molecule and had an end group molecular weight of $(4.07 \pm 0.10 \times 10^3)$.

7.0 GAS CHROMATOGRAPHY

Brenner, Nathaniel
Drug and Cosmetic Industry 80, 166-167, 261-264 (February 1957)

7.0 THE ESTIMATION OF VINEGAR AND SALT IN FISH FLESH OF MARINADES

Ratz, W.
Fischw. -u. Feinkostind. 28, 105 (1956)
Food Science Abstracts 29, 219 (June 1957)

To estimate the content of vinegar, 0.5 to 1 g. of fish flesh is homogenized and suspended in water, and after 30 minutes the extract is titrated with 0.1 M sodium hydroxide in the presence of phenolphthalein as indicator, to the first permanent pink color. To estimate sodium chloride, the sample of fish flesh homogenate is ashed, the ash suspended in hot water and filtered, and the filtrate titrated with 0.1 M silver nitrate in the presence of potassium chromate.

7.43 MODIFICATION OF GRAU AND HAMM'S METHOD FOR THE DETERMINATION OF WATER BINDING

Connell, J. J. (Torry Research St., Aberdeen, Scot.)
Naturwissenschaften 42, 443 (1955) (In English)
Chemical Abstracts 51, 3726 (March 10, 1957)

For the detn. of the "loose" water in muscle macerates (Grau and Hamm, C.A. 47, 1129g) difficulties are experienced if the percentage is 94 or more (fish). Then the wetted area of the filter paper is no longer proportional to the amt. of "loose" water. More accurate results are obtained by removing the pressed macerate from the paper and weighing the absorbed water.

7.43 RAPID DETERMINATION OF WATER IN WHOLE PRESERVE SAUCES, SLICED SEELACHS, FRYING FAT, HERRING FLESH, TOMATO MARC, FISH MEAL, ETC. BY THE ALADIN APPARATUS

Anonymous
Fischw. -u. Feinkostind. 28, 82, 83 (1956)
Food Science Abstracts 29, 219 (June 1957)

The apparatus, Ultra X, fitted with a source emitting infrared rays and with a precision balance, can be used for the rapid drying of 5 to 10 g. samples of various foods. Another similar instrument, Aladin II, can also be used for the measurement of water content. Being of robust construction, it is suitable for general work in a factory. Another moisture-measuring instrument is the Universal, which is fitted with a voltmeter.

7.52 THE PEPSIN-DIGEST-RESIDUE (PDR) AMINO ACID INDEX OF NET PROTEIN UTILIZATION

Sheffner, A. Leonard; Eckfeldt, Gladys A.; and Spector, Harry
The Journal of Nutrition 60, 105-120 (September 10, 1956)

(Abstract of this article appears under 0.7 page 1 - April 1957)

7.52 QUANTITATIVE DETERMINATION OF 0.05-5γ OF AMINO ACID NITROGEN ON PAPER CHROMATOGRAMS AND IN SOLUTION

Kornberg, H. L. and Patey, W. E. (Univ. Oxford, England)
Biochim. et Biophys. Acta 25, 189-93 (1957) (In English)
Chemical Abstracts 51, 15688 (October 25, 1957)

The preferential absorption of NH_3 by Dowex-50 at pH 5.0 is used to eliminate its interference in the quantitative ninhydrin procedure.

7.52 THE PROTEINS OF SHELLFISH. I. PAPER ELECTROPHORETIC ANALYSIS OF MUSCLE EXTRACTS OF CLAM (MERETRIX MERETRIX) OF LOW IONIC STRENGTH

Baba, Haruo
Ann. Rept. Natl. Inst. Nutrition (Tokyo) p. 37 (1956)
Chemical Abstracts 51, 16971 (November 10, 1957)

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Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner and Freezer
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feed Bag (supersedes Flour and Feed)
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

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Editorial Clerk (Typist)--Gladys K. Chandler

7.524 THE DETERMINATION OF THE SH GROUP

Freytag, Hans
Parfums cosmet. savons No. 112, 19-29 (1955)
Chemical Abstracts 50, 9485 (July 10, 1956)

7.524 PROTEINS. XLI. DETECTION OF THE SULFUR-CONTAINING AMINO ACIDS AND THEIR PEPTIDES BY DIAGONAL CHROMATOGRAPHY AND DIAGONAL ELECTROPHORESIS

Mikeš, Otakar and Holeyšovsky, Václav (Czech. Acad. Sci., Prague)
Chem. listy 51, 1497-1500 (1957)
Chemical Abstracts 51, 16635 (November 10, 1957)

A new paper chromatographic technique is described for the detection of methionine and methionine sulfone.

7.595 DETERMINATION OF ANTIOXIDANTS IN EDIBLE FATS

Anglin, C.; Mahon, J. H.; and Chapman, R. A., Jr.
J. Agric. & Food Chem. 4, 1018-1022 (1956)
Food Science Abstracts 29, 237 (June 1957)

7.595 SEPARATION AND IDENTIFICATION OF FOUR ANTIOXIDANTS: BUTYLATED HYDROXYANISOLE, BUTYLATED HYDROXYTOLUENE, N-PROPYL GALLATE, AND NORDIHYDROGUAIARETIC ACID, BY PAPER CHROMATOGRAPHY

Mitchell, Lloyd C. (Division of Food, Food and Drug Administration, Washington 25, D. C.)
Journal of the Association of Official Agricultural Chemists 40, 909-915 (August 15, 1957)

This paper described a procedure for the identification of any combination of these four antioxidants.

7.595 PAPER CHROMATOGRAPHY OF THE TETRACYCLINE ANTIBIOTICS AND THEIR EPIMERS

Selzer, George B. and Wright, William W. (Food & Drug Admin., Washington, D. C.)
Antibiotics & Chemotherapy 7, 292-6 (1957)
Chemical Abstracts 51, 16646 (November 10, 1957)

A new system for sepn. of the tetracycline antibiotics and their epimers, by ascending paper chromatography, is described.

7.599 INTERIM PLAN FOR STANDARDIZING THE BIOASSAY OF PARALYTIC SHELLFISH POISON BY USE OF A REFERENCE STANDARD

Anonymous
Department of Health, Education, and Welfare, Public Health Service, Washington 25, D. C. (May 7, 1956)

(Abstract of this article appears under 2.9 page 5 - December 1956)

7.599 FOLLICULAR HORMONES. XI. QUANTITATIVE ANALYSIS OF FOLLICULAR HORMONES IN FIN WHALE OVARY

Nagasawa, Kakuma; Koshimura, Einosuke; and Okazaki, Seiichi
Eisei Shikenjo Hokoku No. 74, 185-7 (1956)
Chemical Abstracts 51, 8360 (June 10, 1957)

Estrone and estradiol are isolated from the frozen ovaries of fin whale.

7.614 SLOPE-RATIO LIVER-STORAGE BIOASSAY FOR VITAMIN A

Ames, Stanley R. and Harris, Philip L.
Analytical Chemistry 28, 874 (May 1956)

The slope-ratio liver-storage bioassay for vitamin A employs a "5-point common-zero" statistical design. Five groups of depleted rats are supplemented as follows: two levels of the reference standard, two similar levels of the test material, and a negative-control group. The relative potency is determined by the ratio of the slopes of the two linear dose-response lines. Comparison of the results obtained by either the slope-ratio liver-storage or growth procedure showed no significant difference.

7.615 SEPARATION OF VITAMIN A ALCOHOL AND VITAMIN A ESTERS BY PAPER CHROMATOGRAPHY

Kaiser, Elizabeth and Kagan B. M. (Medical Research Institute of Michael Reese Hospital, Chicago, Illinois)
Archives of Biochemistry and Biophysics 63, 118-121 (July 1956)

The separation of different forms of minute amounts of vitamin A in 1:1 isopropyl alcohol-water mixture proved to be applicable to crystalline vitamin A as well as to serum and tissue vitamin A. The addition of minute amounts of Tween 20 to the samples facilitates the migration of the different forms of vitamin A on paper strips.

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7.89 FRESH FISH HANDLING

Anonymous
Report of the Food Investigation Board (Great Britain) for 1954, pp. 33-36 (1955)

(Abstract of this article appears under 2.4 page 3 - July 1957)

7.89 FOOD TEXTURE RAPIDLY GAGED WITH VERSATILE SHEAR-PRESS

Kramer, Amihud
Food Engineering 29, 57 (May 1957)

(Abstract of this article appears under 0.118 page 1 - October 1957)

7.89 HISTOLOGY OF FISH PRODUCTS. III. PRESERVED FISH

Ricotta, Biagia M. C.
Conserve e deriv. agrumari (Palermo) 6, No. 21, 3-6 (1957)
Chemical Abstracts 51, 14157 (September 25, 1957)

A review of histological methods of detg. degree of freshness of canned fish.

8.59 AMBERGRIS AND GRISAMBROL

Anonymous
Drug and Cosmetic Industry 80, 100 (January 1957)

(Abstract of this article appears under 6.73 page 23 - April 1957)

8.59 POLYSACCHARIDE SULFATE, ISOLATED FROM THE LIVER OF A SQUID

Maki, Masahiro (Univ. Hirosaki)
Hirosaki Med. J. 7, 175-9 (1956)
Chemical Abstracts 51, 2184 (February 10, 1957)

A polysaccharide sulfuric acid ester is isolated from the liver of a squid (Ommastrephes sloani pacificus). The quant. analyses reveal that the substance is composed of: N, 1.9 to 2.1; reducing substance after acid hydrolysis, expressed as glucose, 75.0 to 77.2; hexosamine, 11.7 to 12.0; hexuronic acid, 12.8 to 13.1; sulfate-S, 1.8 to 2.0; and ash, 6.8 to 8.0 percent.

8.59 IDENTIFICATION OF THE PINK PIGMENT OF CANNED TUNA

Brown, W. Duane and Tappel, A. L.
Food Research 22, 214-221 (March-April 1957)

(Abstract of this article appears under 3.331 page 7 - November 1957)

8.6177 VITAMIN A_1, A_2, AND NEOVITAMIN A IN SHARK LIVER OILS

Pradhan, S. K. and Magar, N. G.
Indian J. med. Res. 44, 11-20 (1956)
Food Science Abstracts 29, 218 (June 1957)

The livers of 5 species of Indian shark contained 28 to 66 percent of oil, with iodine values ranging from 74 to 139, and free fatty acid contents of 0.1 to 0.2 percent. The content of vitamin A in the oil varied with the species, and was particularly high in Sphyrna; it was not related to the iodine value, but increased with depth of color of the oil. Figures are given for the amounts of vitamin A_1, vitamin A_2, and neovitamin A_1, in the different oils. Flowing chromatography on alumina columns indicated the presence of anhydrovitamin A, kitol, epoxides, sterols, etc.

8.6179 UNSAPONIFIABLE MATTER OF THE FATTY SUBSTANCES OF SEI WHALE LIVER

Tsuchiya, Tomotaro and Tanaka, Akio (Govt. Chem. Ind. Research Inst., Tokyo)
Repts. Govt. Chem. Ind. Research Lab. (Tokyo) 50, 367-9 (1955)
Chemical Abstracts 50, 11035 (August 10, 1956)

The unsaponifiable matter of the fatty substances of Balaenoptera borealis liver was sepd. into 2 parts by soly. in MeOH. The insol. part was a cryst. solid, apparently cholesterol. The sol. part was analyzed by chromatography into a large amt. of vitamin A and a small amt. of highly unsatd. hydrocarbons. Since the absorption band showed α max. 350, 367, and 387 mμ, resembling that of anhydro vitamin A, the vitamin A component seems to have 6 (most probably) or more conjugated double bonds.

8.8 AMINES IN FISH MUSCLE III. SPOILAGE OF ICED EVISCERATED COD

Dyer, W. J.; Dyer, F. F.; and Snow, M.
Journal of the Fisheries Research Board of Canada 6, 403-413 (March 1946)

(Abstract of this article appears under 2.01 page 1 - October 1957)

8.8 VOLATILE NITROGEN IN ANCHOVY PRESERVES AND JACK MACKEREL FROM THE WATERS OF THE MAR DE PLATA, ARGENTINA

Frontini, Jorge Oscar
Rev. fac. cienc. quim., Univ. nacl. La Plata 28, 57-64 (1953-54)
Chemical Abstracts 51, 14157 (September 25, 1957)

Volatile (I) and ammoniacal N (II) were detd. in uncanned and preserved fish to establish the amt. of deterioration occurring before canning and after. Anchovy (III) preserved 5 days at 0° contained I 40 and II 12 mg. percent. After canning with steam 20 min. I/II was 28/10. III pickled in brine and sterilized 2 hrs. at 1 atm., as done in meat canning, had I/II of 78/46. III kept 3 days at 15° showed I/II 101/43, dropping to 84/31 when steam canned but increasing to 134/69 when brine sterilized.

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